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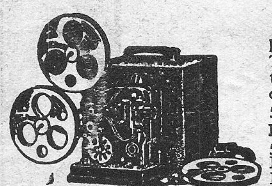

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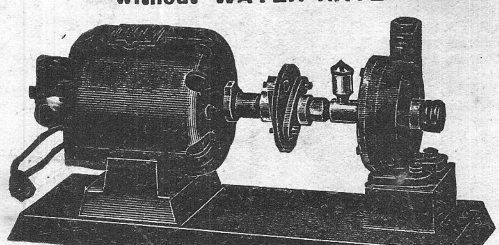

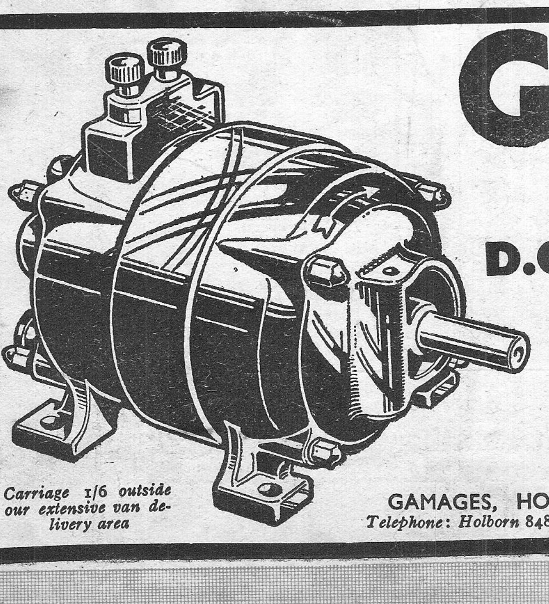

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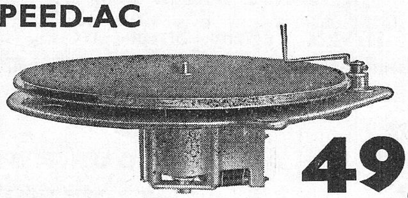

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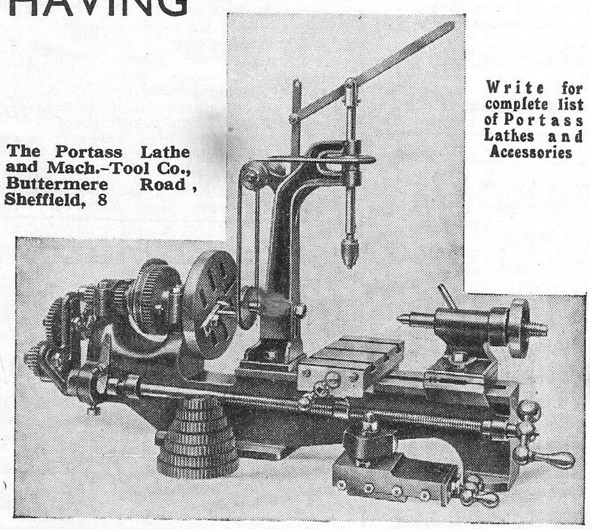

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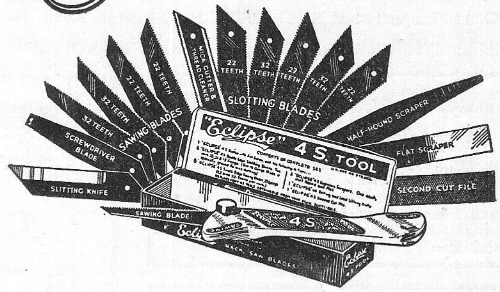

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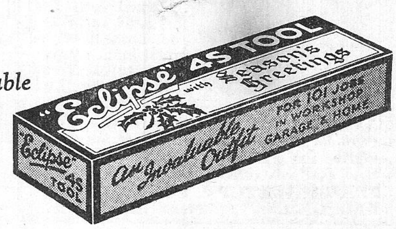

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The MODEL ENGINEER

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SMOKE RINGS

An Industrial Revolution.

ELSEWHERE in this issue will be found an account of some developments in the extensive organisation of the British Oxygen Company, Ltd. As I had the privilege of visiting these works I should like to record some impressions of the revolution in industry which is quietly but effectively taking place as the result of oxy-acetylene welding and its allied processes. My mind goes back to my own apprenticeship days, when I was caused a considerable amount of mental agony by discovering that I had taken a couple of " thous " too much off a spindle I was turning. It wobbled in the hole it was supposed to fit. " Eh, lad," said my neighbour on the next lathe " get thee to t'smithy and ask for the putting-on tool." In my innocence, away I went to the smith's shop. Here I was told that the " putting-on " tool had just been borrowed by Jack Jones, who worked at the far end of the machine shop. Jack Jones told me that Bill Brown in the pattern shop had taken it. Bill Brown sent me scurrying to the foundry, where they were " casting a new handle for the tool." And so I went from pillar to post until it dawned on me at last that there was no such thing as a " putting-on " tool, and that the men were quietly pulling the leg of a raw apprentice. But now I have seen a putting-on tool in real life, the oxy-acetylene torch, which among its other many applications can put fresh metal on worn or undersize parts. In a film of the British Oxygen activities I saw the torch being used to re-build worn points and crossovers of railway tracks, by putting new metal on to the sections which had been worn away by the continuous traffic. That is only one aspect of the possibilities of the oxy-acetylene flame. The welding of pipes, girders, plates and similar constructive details is a very large field for its application, including of course the small locomotive and other boilers, and the varied light engineering jobs, for which so many of our readers have reason to adopt it. In large engineering works it is playing a part in the " fabrication" of engine details, that is the building up of frames and other components from sheet and bar metal, to take the place of what used to be expensive and elaborate castings and forgings. It is equally efficient in cutting apart as in building up, and the sight of an oxy-acetylene flame cutting its way through a slab of steel several inches in thickness is something to marvel at. The cleanliness and exactitude of the cut, and the narrow width of the cleavage area are remarkable. I have even seen the teeth of gear wheels cut out to shape by this process. In destruction as well as construction it played its part, and it is a treasure in the hands of the ship-breaker or contractor who has to demolish a steel-framed building. I experienced a pang of real regret as I saw on the film the much-loved *Mauretania* falling to pieces under the persuasion of the oxy-acetylene torch. Still another application of this magician's wand of the workshop is in metal spraying, whereby a film of zinc, or copper, or other metal is applied to any surface as quickly and as easily as it could be painted with a brush. For the protective covering of exposed structures this is a very valuable process. What a remarkable development this is from the old days when one of the chief uses of a cylinder of oxygen was to supply the lime-light for a magic lantern, or for a spot-light on the stage. Workshop methods during the past few years have been undergoing a real revolution in which the industrial application of oxygen and other gases through the technical research and enterprise of the British Oxygen Company, Ltd., have played no small part.

That Younger Feeling.

AN old friend of the "M.E." in writing me recently concludes his letter with these words :—"I obtain the greatest amount of pleasure out of my workshop even at 60 years of age. I feel more like 40 when at work." I think that is true of any hobby or occupation in which you are intensely interested, but there is nothing like a model engineering workshop for making you forget the troubles of advancing years, or your other cares in life. I remember the remarkable case of the late Mr. G. F. S. Desvignes, who built excellent model engines at the age of 80, and spent all his years of retirement in his workshop with his beloved lathe and tools. The only concession he made to increasing age was to put in an electric motor to drive his lathe, and so relieve him from the physical exertion of treadling it. Similarly the late Sir Francis Spring built a grandfather clock as a present to himself on his 80th birthday. Yet another example of old-age activity in model engineering may be quoted in the case of the late Mr. E. L. Pearce, whose life story is so sympathetically told in this issue by "Phantom Pen." There is no doubt that Mr. Pearce's handicraft activities prolonged his span of years, and it is a matter of great regret to all his friends, that he did not live to complete his favourite design for a model locomotive. There are dozens, perhaps hundreds of model engineers, of advanced years still happily and healthfully engaged in their workshops. Long may they live and flourish.

* * *

Stationary Engine Modelling.

A CORRESPONDENT sends me a plea for more matter relating to stationary engines, and engines of various types other than locomotives. I realise that this is not a solitary expression of opinion, for others have expressed a similar request. Our locomotive articles interest some thousands of our readers, and naturally fill a good deal of our space, but I am arranging for some designs and articles which I hope will appeal to those whose fancies lie in other directions. As an instance of this I have asked Mr. J. N. Maskelyne to get out working drawings for a set of launch engines which can be built either as a working model for a boat, or as show piece. There is much nice machining and fitting to be done on a model of this kind, and I hope Mr. Maskelyne's efforts will have a wide appeal. His drawings will appear as a supplement plate to be presented with our issue of January 2nd.

* * *

Modern Developments in Model Racing Boats.

THE lecture on the above subject, held under the auspices of the M.P.B.A. on Thursday, Nov. 28th, was a decided success, and has encouraged the Association to proceed with their scheme of lectures and discussions during the winter session. The subject was well illustrated by a set of fifty lantern slides, depicting many well-known model speed boats and their owners, from the late Mr. F. Westmoreland's "Evil Spirit," to such well-known present-day examples as "Betty," "Nickie V," and "Oigh Alba II." The salient features of all the craft shown were reviewed, and the tendencies in modern design summarised. After the slides had been shown the meeting was thrown open to discussion, and many interesting points were raised on vital factors in design, such as planing angles, propeller shaft angle and position, and propeller efficiency. There can be no doubt of the effectiveness of meetings of this nature, in a field so purely experimental as model speed boats, in co-relating individual ideas and investigations, and helping to establish more exact knowledge. The next meeting is provisionally fixed for Thursday, Jan. 6th, and it is hoped that on this occasion it will be possible to arrange for a very interesting discussion on engine design and research. Further details will be announced in due course.

* * *

Broadcast Talks on Model Engineering.

IN a recent broadcast from the Midland Regional station, Mr. W. J. Bassett-Lowke dealt with the subject of ship modelling and gave some useful instructions for constructing scale replicas of past and present prototypes. His next talk will be on the subject of Model Railways, including advice on planning and layout, control, and power equipment, from the Midland Regional, on Tuesday, December 17th, at 5.30 p.m.

* * * *

The "President Washington" Locomotive.

MR. B. H. Wainwright writes: "In the October 17th issue of 'Ours,' you published a query of mine re 'President Washington' model loco. I am very pleased to say that I have received several letters and photographs from American readers who have completed one of these engines. It would seem that there are no readers building one over here; mine is well under way, the boiler is completed, cylinders, wheels, framing, etc. Thank you for publishing my query." This is yet another instance both of the world-wide circulation of the "M.E." and the helpful response which our readers so often give to one another when any difficulty arises.

Percival Marshall

SHOPS SHED & ROAD

A Column of "Live Steam."

By "L. B. S. C."

Any More for the Sweep ?

In addition to Mr. George Stevenson's silver cup, Bro. Kennion's tools and material to the value of three guineas, and three separate two guineas' worths (cash or kind) offered by Mr. E. H. Meers, Mr. C. B. Williamson, and your humble servant, there are now two newcomers to the prize list. The genial casting merchant of Montreal, Canada, Bro. Bill Ramage, says that when most builders have completed an engine, they want to get busy right away on another, and usually a more ambitious one; therefore, to assist to that end, he will present, carriage paid and duty paid, a complete set of castings for "Uranus," "Ursa Max," or any other of Mr. Josslin's 2½" gaugers which the winner might fancy. The dextrous knight of the pencil himself, will very kindly add the needful set of blueprints. This "reward that sweetens labour" will of course be a separate prize, no two awards going to the builder of the same engine; and Brothers Bill and Alex say that they would like sustained hauling power to be the especial feature of the engine that qualifies for this prize. Three cheers for the Maple Leaf!

Mr. T. G. Marchant, of the Express Loco. Supplies Co., considers it is hard luck when anybody just "misses the train," in a manner of speaking, so he will give goods to the value of half-a-guinea, to the brother who just fails to grab one of the principal awards, as a consolation. Thanks very much, "Bro. Nonstop." That makes seven awards up to the time of writing, and I guess it not only makes records in the history of this journal and the Exhibitions, but is a concrete example of the real brotherhood feeling toward newcomers to the locomotive-building craft.

A few days ago (time of writing) I deposited a little more Surrey mud on the carpet of our worthy boss's sanctum, and had a little confab with him on the subject of the extended competition. He said quite frankly that certain difficulties might arise in awarding the prizes if we were flooded out with entries; but difficulties are made to be overcome, and if you get stuck on a bank with a heavy train, you can always "double it"—that is, uncouple half the train, take that to the top, cut off the engine and come back for the rest. Takes a little longer, and maybe delays the traffic; but still the job is done. Now suppose we get a dickens of a lot of brothers entering the "sweep"—and I hope we shall; the more the merrier—the testing, for example, can be carried out "by instalments" as soon as the engines are ready. There is no need to wait until next September. Anyway, the first thing to do is to find out how many prospective entries there will be, and where the engines are being built; so will all brothers who are thinking of entering the "Dyak Sweep" send me a postcard (either to the "M.E." offices or direct) giving their name and address, and the date when they think their engines will be ready for a track test. They need not be absolutely complete for this.

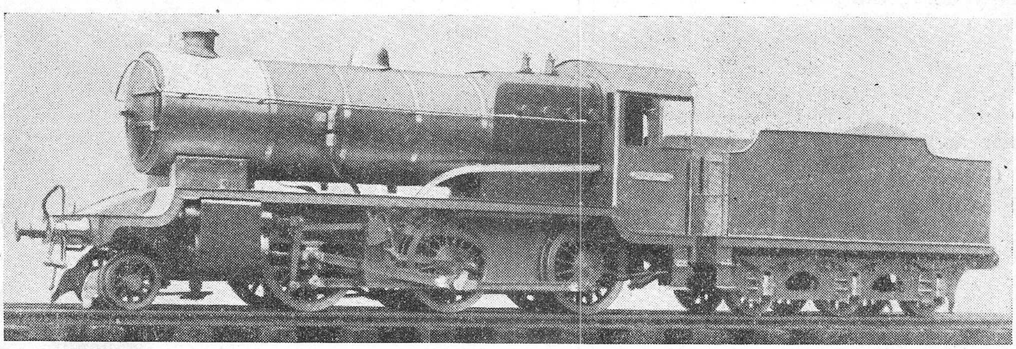


Photo by] **The Dyak "Queen."** [*C. J. Grose*

We want, if humanly possible, to arrange that every engine entered shall show its paces on the track, driven by its own builder. As far as the London area is concerned, this could be arranged by meetings at Romford, or on the new Polar Route, or any other place where a line could be made available. Regarding the provinces, there are usually one or two "Live Steamers" who own a suitable line and would allow a competitor's engine to run on it; also some of the provincial clubs and societies have running tracks. A test could be made on these, and a certificate of performance issued, in a similar way to the manner in which speed boats are tested and certified on provincial lakes and ponds. A form of certificate will be provided. Locomotives of first-class performance, qualifying for awards, may be re-

quired to repeat the certified performance at the Exhibition, if thought desirable, by way of demonstration. That seems quite fair; but if anybody wants to make comments or suggestions, go right ahead. Many noddles are better than few. Eh? sure I know "too many cooks spoil the broth"—who's talking about cooking, anyway? Take my advice and leave that department to the Mrs.!

An example of the need for a proper road test of every engine, was emphatically demonstrated on the afternoon of November 23rd, on the present Polar Route, when two of the entrants to the last competition (Mr. W. Lazell and his brother) brought their locomotives over for a run; and in common fairness and justice to these two painstaking and enthusiastic tyro locomotive builders, I can state here that their engines put up performances absolutely at variance with the criticism in a recent number. I only had one flat car available, to carry two adults; but the locomotive supposed to be under gauge with a predilection for tipping over, ran perfectly with a two-passenger load, on a small throttle opening and the lever well back, blowing off all the time, until she sheared the key in one of the return cranks, which shifted and upset the valve setting—a minor accident which might have happened to any engine. The second locomotive repeated the steaming and pulling performance, and ran until the fire was allowed to die out. Mr. Grose, our picture-shooter, was present, and photographed the engines actually doing the job. Mr. J. N. Maskelyne was also invited, but pressure of other business kept him away. Well, so much for that—and *don't forget those postcards*. So long as they reach me by the first week in the New Year, it will be O.K., and we'll then be able to make further arrangements.

Great Western Cylinder Sizes.

On page 507, November 21st issue, Mr. G. S. Willoughby, replying to Mr. Henry T. Brown, about cylinder sizes, writes "a full-size 'Saint' class locomotive has two cylinders 18" by 30" with a grate area of 27 sq. feet, so that what Mr. Brown is really inferring is that a 'Saint' class loco. should have 24" cylinders for the same grate area." Fine—but there is just one little point friend Willoughby overlooks, and it is the little things that matter. *The reason why the Saint's cylinders are 18½" bore (not 18" as stated) is because she carries a working pressure of 225 lbs. per sq. inch.* If she carried the much lower pressure common to most locomotives at the time the class was designed, 160 lbs. or thereabouts, the cylinders certainly *would* have been very much larger in the bore.

Proof? Sure—only too pleased to produce it. Mr. W. A. Stanier was Mr. Collett's "right hand man" before he went to the L.M.S. The original 2-6-0's of Sir Henry Fowler's design had big bore cylinders, but a comparatively low boiler pressure. When Mr. Stanier designed his version of the 2-6-0, he put up the boiler pressure, and cut a couple of inches or so off the cylinder bores to keep the tractive effort about the same, in accordance with G.W. practice. Incidentally, the smaller cylinders could be set more horizontally, and the engines looked much handsomer than their predecessors, but beyond an alteration in the valve setting to obtain more economical working, the original engines remained unchanged. We, therefore, have two classes of engines, with approximately the same sized boiler, firebox and grate area; yet one has cylinders two inches or so bigger in the bores than the other—but the latter steam continuously with absolutely no difficulty whatever!

If Mr. Willoughby ignores boiler pressure and insists on proportioning cylinders to the grate area, then the old Brighton "Baltic" tanks should have had cylinders about 17½" in the bores—and a fat lot of good they would have been for hauling the 5 p.m. "City Limited" or the 5.5 p.m. Eastbourne business expresses! Actually, the cylinders were 22" bore by 28" stroke, the biggest in this country, if memory serves me rightly, yet I have never heard of any of the boilers being short of steam; they stuck "on the pin" consistently. And *could* they do the job—ask any of the Brighton drivers who handled them! On one occasion No. 332 passed East Croydon nine minutes late with the "City Limited" (one of the heaviest expresses on the line) due to some unforeseen traffic delay between London Bridge and Norwood, yet she arrived at Brighton right on the dot. She was doing about 40 m.p.h. as she passed the station, with five miles of 1 in 264 up to Merstham Tunnel in front of her smokebox, and eleven of the Brighton's heaviest coaches (including a 12-wheel Pullman) behind her tail, but she had "got hold of 'em" as the drivers say, and she rubbed out the 39½ miles in 36 minutes; mere child's play nowadays to Doris, Hazel and Co., with their third rail, but as a job of locomotive work, excelling anything done by a "Saint" between Swindon and Paddington with a lighter load. If anybody can put forward a better example of continuous steaming and sustained hauling capacity, let them speak; only the big cylinders did it.

What are Locomotives Built For?

Mr. J. N. Liversage having "taken my name in vain" in November 21st issue, page 506, maybe I'm entitled to a friendly rejoinder. When figures and theories are *proved* wrong, the conditions under which they were evolved doesn't signify a brass button. Those of us *who actually build our engines* know a whole heap about that—and least said, soonest mended. Certainly there are underlying fundamentals, the observance of which will ensure the success of any engine; we know and apply them; we found them by experience, and not by theory and calculation. I, for one, could not express them in figures and formulae; but I can design *and build* an engine embodying them, and guarantee that anyone who follows my instructions, will get similar results. Latest example, Mr. Hill's "Dyak," no hot-air, but honest fact.

There seems to be an entirely erroneous impression among a certain body of good folk, as to the purpose of a locomotive engine. I always understood it was meant to run on a

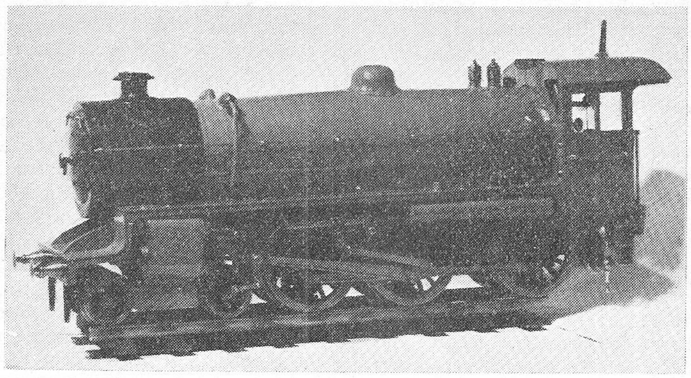
track, and pull a train at a high speed if for passenger work, or haul a mighty load if for goods work; but on reading the correspondence it seems that I'm all wrong to blazes! Apparently a locomotive is built for the purpose of mounting upon a testing stand and amassing a huge collection of figures and formulae, etc., so that the makers can go and build another one and repeat the performance ad infinitum. Thank goodness, some of our Chief Mechanical Engineers lean to the first belief, and consider that the engine which goes the quickest, or pulls the biggest load as the case may be, and does it with the least consumption of coal and water and the lowest maintenance is the best engine. That is my own idea exactly, and I am glad to note that it is shared by Mr. Metcalfe, and many others who have written direct. Any full-size driver who knows his job, can tell you whether an engine is good, bad, or indifferent, without bothering his noddle about power curves, maximum adhesion (hear him hold forth on this when the sanders go on strike!) and other data dear to the heart of the calculationists; and as to the haulage test not being a true method—surely, seeing that hauling is essentially a locomotive's work, the better the haul, the better the engine. Sustained haul, of course; not spasmodic jerk, like the old horse at Euston who, when hooked on to the drawbar of the dynamometer car, gave a mighty heave and registered 17 h.p.

The Romford boys know which of their engines do the job best, without the need of brake tests or any other "scientific" business. When an engine will do a dozen laps or more on one firing, with a tidy load, and attain a speed of ten actual miles per hour on a 2½" gauge railroad, it doesn't need columns of figures to prove its efficiency; and its owner and builder wouldn't give a tinker's cuss for the result it gave on a test stand. They can't reproduce all sorts of weather conditions on the test plant at Vitry, nor the effect of side winds, slippery rails, actual traffic conditions, different handling by different engine crews, and the hundred and one things a locomotive has to put up with in everyday service. As to Swindon and Altoona—as Alexander and Mose used to say, hush yo' mouf, boy!

There is one paragraph of B.H.P.'s letter, same issue, which is absolutely gospel; he says, there are some things which are not known outside the Chief Engineer's offices, and are "closely guarded trade secrets." I might add that the *correct* valve setting, etc., of certain locomotives is one of them; and that is why I always indulge in a chuckle when somebody or other trots out published dimensions of ports, valves and settings in argument, or as confirmation of their own ideas on the subject. 'Nuff said!

Supplies in Australia.

Mr. O. Burnaby Bolton, of Sydney, N.S.W., writes to say that the statement made by certain Australian correspondents about castings, parts, and material being hard to obtain in Australia is not correct; for in addition to Mr. Bryden, he also supplies the necessary stuff for building little Australian engines, and has made numerous blueprints of them. An engine built by friend Bolton himself is illustrated herewith, and she certainly seems a realistic job. She is a 2½" gauge copy of the New South Wales "C36" class, and was designed and built according to Live Steam specifications. The boiler is coal fired, and has a spearhead superheater; twin axle pumps, all usual cab fittings; big-ported cylinders and Walschaerts gear, and runs equally well in either direction. The whistle is worked by a ramp beside the track, and the regulator handle through the cab roof is part of a remote control arrangement, whereby steam can be automatically shut off when approaching a signal at danger, thus adapting the engine for use on scenic work as well as passenger-hauling. Mr. Bolton has also built another similar engine with a Stephenson link motion of the type being described for "Maisie," (to be continued next week, by the way) except that it has plain unforked eccentric rods coupled to one side of the link only, same as I fitted to Mr. Nash's "Bluebell" (sister to "Ayesha").



N.S.W.R. "36" built by Mr. O. B. Bolton.

Friend Bolton says it gives the country a bad name, to say the least of it, when it is alleged that supplies are not forthcoming, whilst all the time several Australian firms can supply parts, castings and material for "Dyak" "Fayette" and other Live Steam engines, in addition to various Australian types. I fully agree, and am glad to be able to call attention to the matter, but—"Advance, Australia"—into our advertisement columns!!

Answer to Correspondent.

L.W.D.-O. (Pedmore).—Obtaining official drawings of locomotives will not help you very much, unless you are practised in translating them into working models. The particular engine you have chosen requires a considerable modification, in valve gear particularly, to obtain good results.

In the GLOW OF THE FORGE

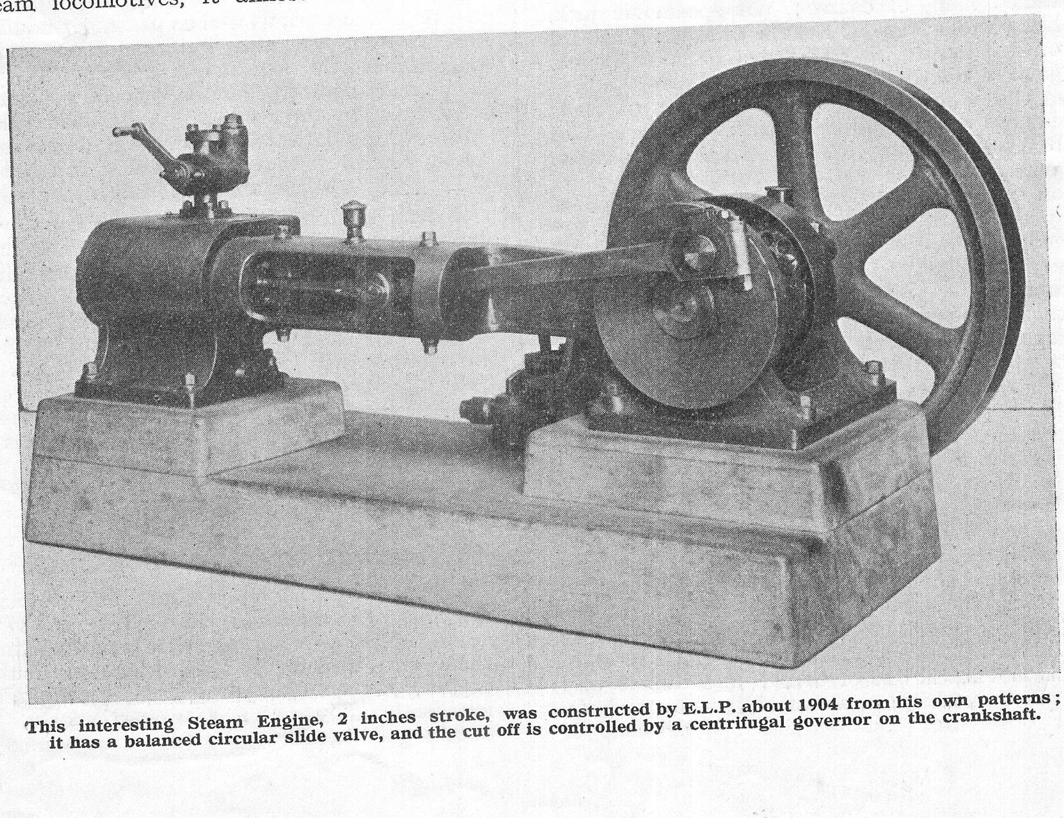
By "PHANTOM PEN."

"The bellows ceased, the flames decreased,
Though on the forge's brow
The little flames still fitfully
Play through the sable mound."
FERGUSON—"*Forging of the Anchor,*"

Edwin Lewis Pearce—("E.L.P.")—A Retrospect

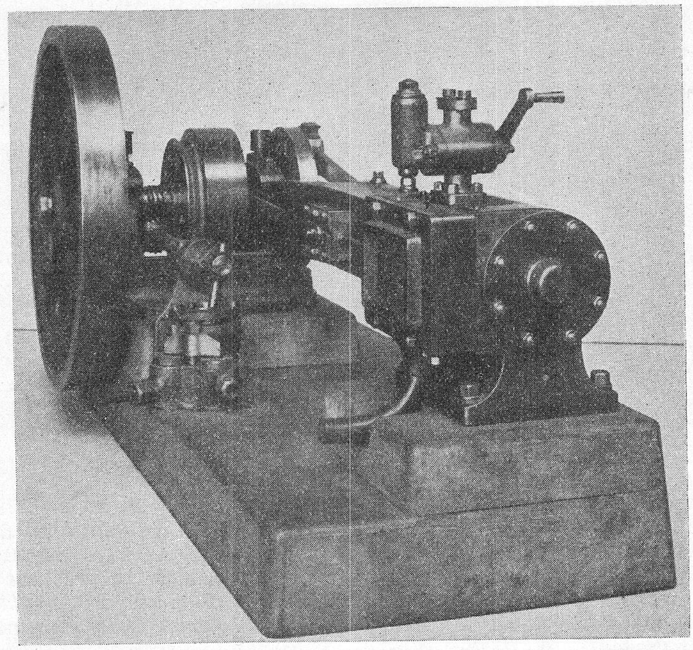
WHEN I suggested "In the Glow of the Forge" as title for my articles a friend expressed approval;" it has a homely and cheerful sound." Thus, appropriately, my memoir story should read homely, cheerful and simple of expression, these were salient characteristics of E.L.P. in speech, act, and demeanour. Close friendship existed throughout the major part of our lives, never an unkind word or acrimony of dispute or argument passed between us. Much do I owe to E.L.P., the example and influence of his gentle nature, intelligence of mind, unselfishness in all things, sound reasoning upon model engineering and other technical matters, and the general occurrences common to everyone. His thread of life stretched through various windings, even to far-away Denver City in Colorado, and the Rocky Mountains, as Atropos drew it from the spindle of Fate, until Lachesis closed her shears upon it September 14th, 1935, its length equalled 77 and a half years.

His main engineering interest was with steam locomotives, it almost dominated his thoughts and desires. This affection, it really was so, commenced, I understand, when he was a "crawling baby"; his father bought for him a toy wood engine with which he was fascinated, and it gave the bent towards locomotives which persisted throughout his life; indeed, his final work was endeavour to complete the model shown by the accompanying photograph. His draughtsmanship was exquisite, he made beautiful shaded and coloured drawings of locomotives to his own ideas of designs for full size practice. A talent for charm and proportion in model locomotives is apparent by the L.N.W. "Lady of the Lake" type express engine 2-2-2, and tender; a working drawing of this model was published in THE MODEL ENGINEER of January, 1900, with a description in that and the following issue of February. The scale is approximately ⅝ in. to one foot, or 1/20 full size. Also with the "Dunalastair No. 3" design, scale ¾ in. to one foot, February 1st, 1901, volume 4, with description continuing to volume 5; the concluding article being in the issue of November 1st, 1901.



This interesting Steam Engine, 2 inches stroke, was constructed by E.L.P. about 1904 from his own patterns; it has a balanced circular slide valve, and the cut off is controlled by a centrifugal governor on the crankshaft.

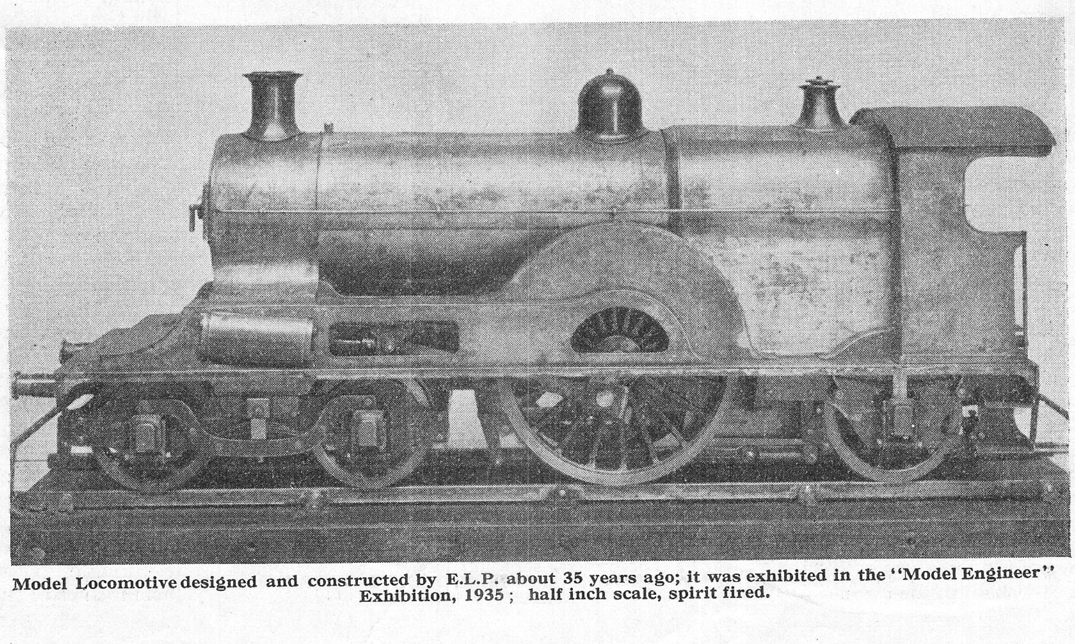
In this he refers to full working drawings published in "Engineering" of May 18th, 1900, for accuracy of a scale model without regard to efficiency as a working model. The article in THE MODEL ENGINEER is remarkable for range of detail drawings.



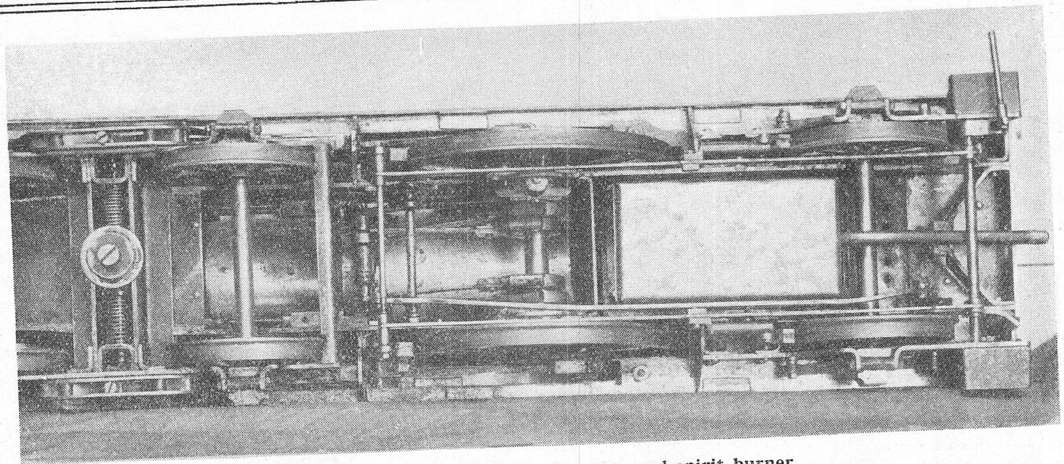
End view of the Horizontal Steam Engine, showing feed pump driven by screw gearing; presumably to feed a water tube boiler E.L.P. had designed for steaming this model.

His occupation was mainly as a draughtsman, for a considerable period in H.M. Office of Works and with a steel construction firm, but never, so far as I recollect, in an engine builder's or locomotive works drawing office. He had no training in mechanical practice, the skill he possessed was self acquired. At certain periods he was employed in some workshops on light electrical fitting and turning, and was a member of the staff of THE MODEL ENGINEER in its early days. About the years 1885-1886 he constructed a dynamo, Manchester type, with a Gramme ring armature, and later designed and made several small dynamos and electric motors, noteworthy for pleasing form and good performance. The armatures, ring and drum, were slotted type, the slots being of peculiar shape, devised according to his own ideas, to promote sparkless collection at the brushes, yet diminishing reluctance of the air gap, between armature core and field magnet poles. These slots were cut in standard plain stampings by means of a hand operated lever press; he contrived and made this for the special purpose, also the punches and dies.

At an early period one of his brothers, became induced to share enthusiasm for locomotives; together they listed particulars of the London, Chatham and Dover Railway engines, size of driving wheels, diameter of pistons and stroke, calculated tractive effort, and travelled in trains for amusement to ascertain performance and speeds. Also, he had a footplate trip from London to Dover and back. Each made working model locomotives of cardboard and wood to actual prototypes, these models were ingeniously driven by means of indiarubber elastic, wound to and fro over a number of pulleys, so that a considerable length was contained within the frame. Tension is applied and energy stored in the elastic by winding the driving wheels. When the engine was placed on a floor, and the wheels released, the pull of the elastic rotated them and caused it to run along; good speed and



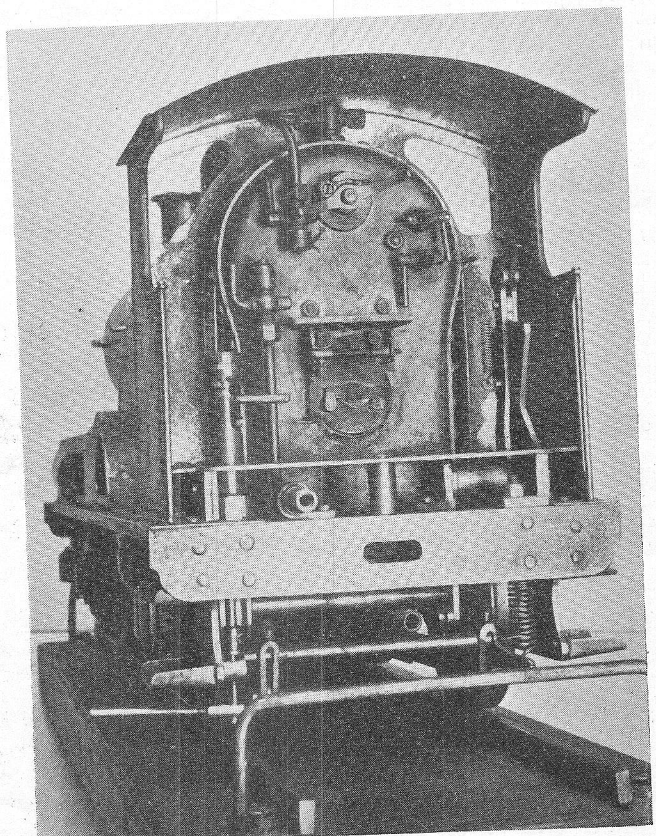
Model Locomotive designed and constructed by E.L.P. about 35 years ago; it was exhibited in the "Model Engineer" Exhibition, 1935; half inch scale, spirit fired.



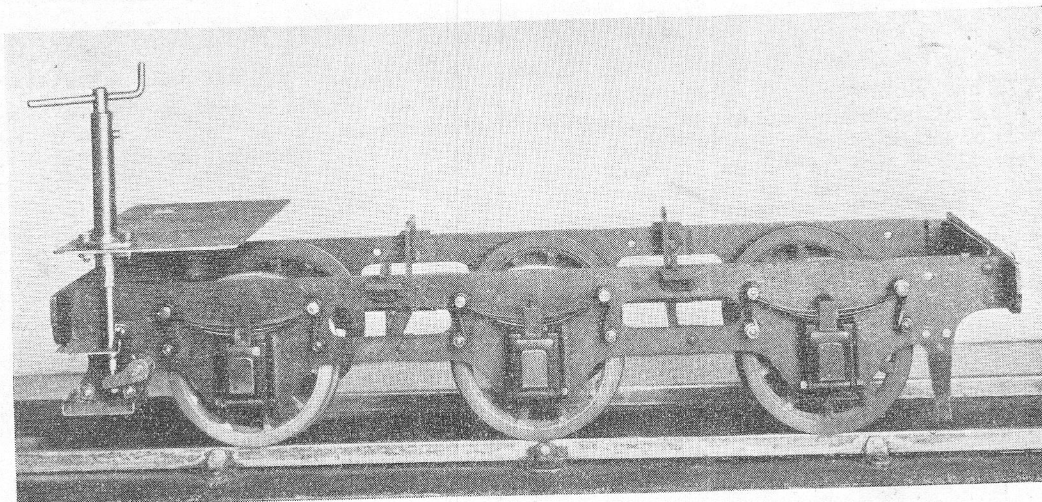
Underneath view, showing valve gear and spirit burner.

length of runs were obtained. The cardboard was built up with several sheets of Bristol board, glued together and compressed, so that a flat and stiff material was formed. Another combined interest was a model steamboat about five feet long, the hull was shaped and hollowed from a single block of wood. Propelling machinery consisted of a vertical slide valve engine and marine type boiler, made by the old-time model trades engineer Robert A. Lee, of High Holborn, London. The fuel was charcoal, at times slow in burning up at start by lack of draught, so E.L.P. made a small centrifugal blowing fan, worked by hand, to urge the fire and save time in raising steam. He contrived an arrangement of rods situated along the deck for convenience in opening and closing the stop valve from either end of the boat when starting and arriving. Some twelve years or so ago, he and this brother retired to a small bungalow in Buckinghamshire; it was designed by E.L.P. and shared between themselves. Cultivation of the garden and incidental fitting and construction occupied his time to the exclusion of model engineering. He added an overhead room, in which he slept, and to free a lower one for use as a workshop and serve his preference for sleeping on top; he built the necessary winding staircase, a coal barn, a tool and garden house, two rustic porches, a summer house, a garden arch, his own idea, capable of withstanding the utmost wind pressure which might occur. This exemplifies his general handiness as a craftsman; he was very skilful at lockwork, with watches, or any sort of mechanical repair or making, and blended humour with seriousness in tackling it. Quite likely he would commence with merriment at the repair or idea.

Later, he revived attention to model engineering and subscribed, as a reader, to THE MODEL ENGINEER, finding a welcome interest with its articles and general matter. Then he resumed construction of the locomotive tender shown by the accompanying illustration, with intention of completing the model to show at the recent MODEL ENGINEER Exhibition. For the purpose, he bought a lathe and turning tools; the tender has remained unfinished. The engine was duly on view in the Competition Section. This model was commenced about 35 years ago, a long interval had thus elapsed since that time. The design is "free lance," based on that of the single driver locomotives of the



End view of the Locomotive, showing interior of cab; notice peculiarity of the reversing lever and, left, control for spirit feed to burner.



The incompleted Tender as left by E.L.P.; his last work. It was exhibited with the Locomotive.

period 1870 to 1880; scale ½ inch, the leading bogie and the trailing wheels have outside bearings. All castings are brass, from his own patterns. My life time association with E.L.P. included cycling tours, running steam launches, (we were part owners), on the river Thames, and sailing on the Norfolk Broads. He was an old time cyclist, a member of the South London Tricycling Club, and gained a silver medal in an early long distance road trial. At the beginning of our friendship, his workshop was in his bedroom; there I saw the commencement of his "Lady of the Lake" type model, the first complete engine he had then made. Previous experience was repairing a small horizontal engine, helping a friend to finish one, and rebuilding an old vertical boiler with inside firebox and water tubes. He had a temporary indoor railway track, which he laid along the hall, each time he wished to work the engine; it extended over the well of the lower staircase, upon supports, to obtain maximum available length. Later, the family removed to a house where a long garden enabled him to have the track of increased length, which was laid on the ground. His chief joy at this removal seemed to be on account of being able to have a longer track on which to run his engine. At disadvantage through not having a professional knowledge of workshop methods and the skill given by workshop training, he was successful by natural intelligence, commonsense judgment and persistent effort. Mechanical work and construction was to him a labour of love. He had understanding of amateur needs and requirements, his book "Model Boiler Making" treats the subject with clearness, simplicity and correctness.

Would E.L.P. have had some marked success as a locomotive engineer if he had graduated through a railway workshop, and had full scope for his bent in actual practice? It pleases me to imagine this might have happened. Yet I conjecture that his gentle retiring nature was not adapted to encounter and bear the stress, or give the driving force requisite, for one to break the shackles of routine, achieve command and lead in so difficult a section of engineering practice. Would he have found equal happiness to that he certainly derived with his workshop, and liberty of designing and making at his own leisure and discretion?

The story of E.L.P. is worth more than casual notice, it proves the solatium and awakening of interest derivable from a return to model engineering at an advanced stage of life. To myself, his passing leaves a void which cannot be filled, it is the farewell of a friend who will never be replaced. But loss is tempered, he finished whilst active with his loved occupation. The mythical old "one horse shay" fell all to pieces at its end; to pass on from life whilst striving for some useful purpose and having left works of potential service to others, this is an end shorn of sadness, the sort of end probably we all desire to meet.

A Weather Factory.

One of England's strangest factories is to be found in Birmingham at the works of Joseph Lucas, Ltd. It is a weather factory in which all climatic conditions from Arctic cold to tropical heat are reproduced for the purpose of testing electrical equipment on motor-cars.

One test room reproduces tropical heat and moisture, both of which are detrimental to the working of electrical equipment, while there is a specially built refrigerator room where Arctic conditions are reproduced.

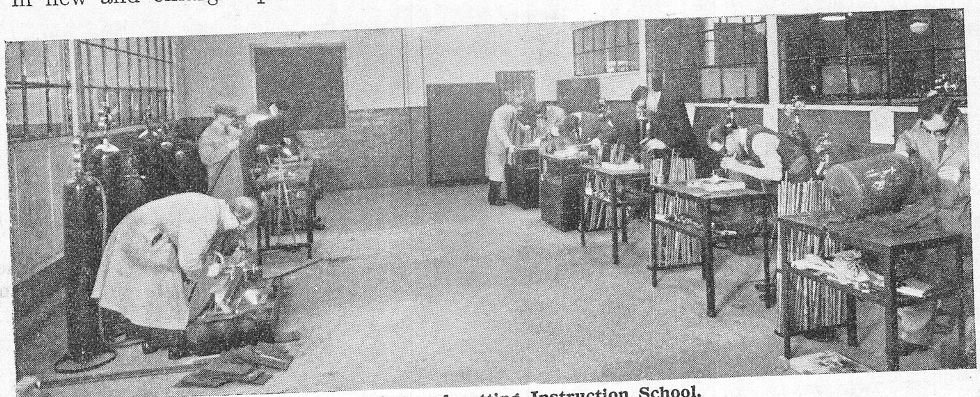
Cars are driven into the refrigerator room and remain there all night to test the self-starting equipment.

Batteries are also subjected to many searching tests. In an atmosphere heavy with steam, batteries are jolted for hours on an uneven turntable.

These tests ensure that, in whatever part of the world the firm's products are used, they will withstand the particular climatic conditions under which they will be used.

The New Demonstration Shops and Instruction School of the British Oxygen Co., Ltd.

WE have recently been accorded facilities for a most interesting visit to the Cricklewood Works of the British Oxygen Co., Ltd., where we were able to inspect their new demonstration shops, instruction school, and showrooms. Although the facilities now afforded at Cricklewood have been available for some years, their concentration at one conveniently reached centre in new and enlarged premises, will be appreciated by their many customers. This enterprise is a striking example of the service facilities placed at the disposal of all concerned in the oxy-acetylene industry, by this progressive Company.



The welding and cutting Instruction School.

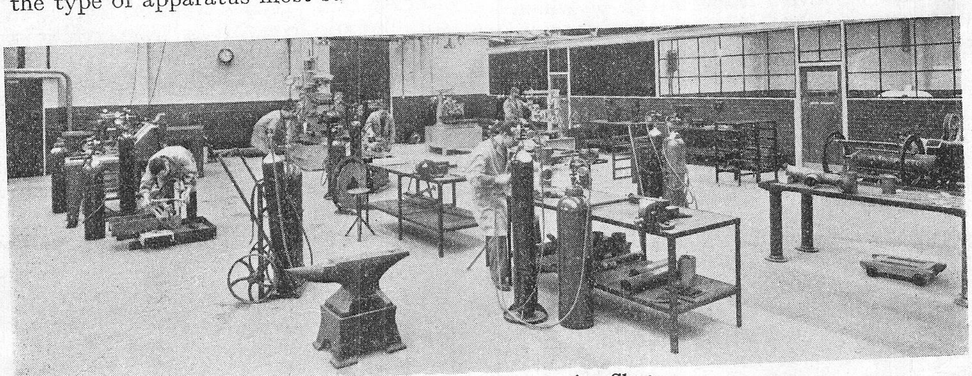
The new premises of the Sales Technical Service Department comprises demonstration shops; a welding and cutting instruction school; a lecture theatre, exhibition showroom, and executive offices.

In the main demonstration shop, there is a complete range of the Company's oxygen cutting machines, welding equipment, hand-cutters and equipment for leadburning, brazing, soldering, etc. In the smaller rooms adjoining are the metal spraying and arc-welding demonstration shops.

Here, prospective customers may see a complete range of the Company's equipment under actual working conditions, and can more easily decide the type of apparatus most suitable for their requirements. Again, a firm may wish to know if the oxy-acetylene process, or metal spraying, etc. as the case may be, will be suitable for the particular class of work they have in hand, and in the demonstration shop, practical tests can be made on the actual job, to ascertain its practicability and to obtain a measure of the cost which would be involved.

The Welding and Cutting Instruction School provides tuition for customers or their operators, who have purchased equipment. But subsequent instruction can be given at any time, and it may happen that a firm using one or other of the processes takes on a different class of work and requires special instruction, which can be given in the school. The provision of a separate instruction school enables students to work without the distraction which might be occasioned by the work always in progress in the main demonstration shops.

The Lecture Theatre is equipped for the showing of cinema films or lantern slides. Monthly illustrated lectures will be given here, and are open to customers, members of the Company's staff, or in fact to anyone interested in the industry. It may be mentioned that the Company has its own cinematograph operator, and produces most of the technical films shown. These films are also available for loan to welding schools, technical societies, and so on. Another use for the Lecture Theatre is to amplify instruction given in the welding and cutting school, by the showing of slides or films relative to the particular work on which they are engaged.



A view of the Demonstration Shop.

The exhibition showroom contains, as far as possible, a complete exhibit of all the Company's products, but more particularly is it intended to show specimens of work which have been done by means of the various

processes. This follows the basic principle behind the Company's service, which is to show what can be done by means of welding, cutting, etc.; to improve the technique of those already using the processes; and also to assist in the development of new equipment and applications.

While it is not a part of the Sales Technical Service Department, the work of the Company's Technical and Research Department, which has been situated at Cricklewood for many years, has an important bearing on the service available from the Company. In these laboratories, all the Company's raw materials and products, such as welding rods, fluxes, purifying materials, carbide, etc., are regularly tested in order to maintain the high standard required. Here also analyses are made, on behalf of customers, of special metals or other materials; in fact, the Technical and Research Department is responsible for all forms of chemical or metallurgical control and research in connection with the industry. The most up-to-date apparatus has been installed.

Tools and Operative Apparatus at the "M.E." Exhibition.

By GEORGE GENTRY.

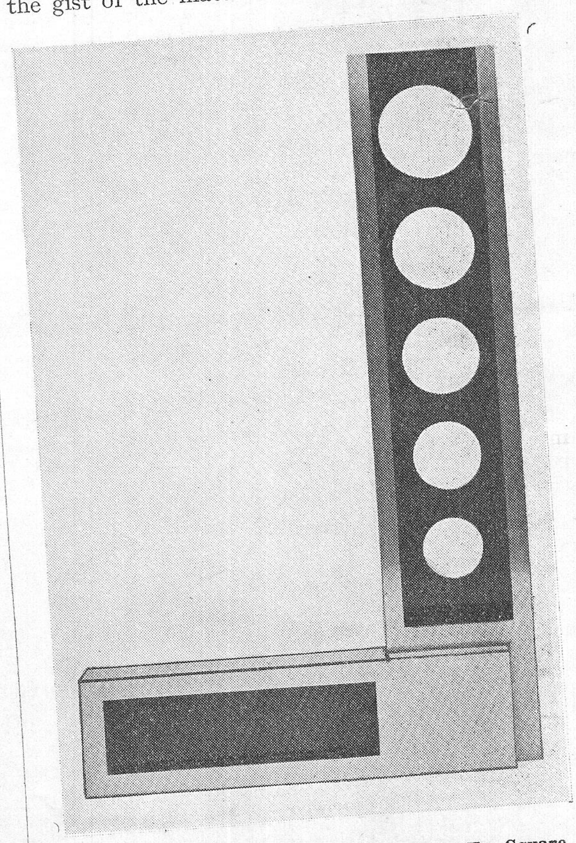
(*Continued from page* 541.)

Messrs. Moore & Wright, Ltd. Britain's Tool Factory, Sheffield.

What we can say beyond that which we have written, time and again, of the excellence of the productions of these tool manufacturers seems superfluous. Most readers, and exhibition visitors, who can use tools, are so familiar with the type of hand tool made by this firm that space would be better employed in referring to absolutely new productions which they were showing. In a general way it may be enough to state that Messrs. Moore & Wright are one of those firms, nearly the only one in some directions, who have standardised tool making in this country to such a fine pitch that their Show—which is that of a true exhibitioner's—is another case of history repeating itself. At any rate. the average reader, who is by way of asking our advice on tools, has only to make sure that Messrs. Moore & Wright's name is on any tool to be also sure that he is getting maximum value for money, and what that money may be, or should be, is duly recorded against a number in their very complete list.

Messrs. Moore & Wright now make the standard pattern of surface gauge and scribing block, mounted upon a steel base, and having a swivelling column capable of fine adjustment, by a lever with knurled head set-screw. Every marker-off knows the type, and also knows that the transatlantic price was very nearly prohibitive. Messrs. Moore & Wright have brought it well within his reach, and it is as good, which is the best compliment one can pay it.

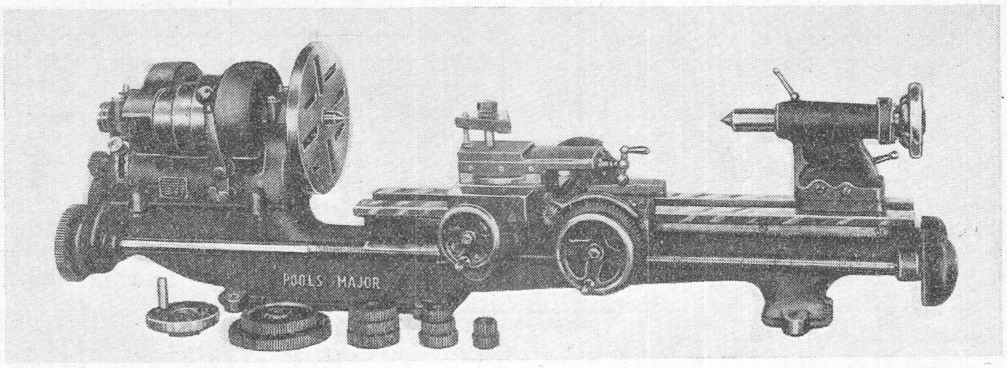
Something else outstanding, to be seen on Messrs. Moore & Wright's stand, was a large size try-square of their make, a photo of which, taken by the writer, is included here. It is an example of a precision square constructed by them to a special order, and to pass a laboratory test of Grade "A" under the N.P.L. certificate. The actual square made and certified is not the one in the photo, but is of similar construction. The point is that it is so designed and proportioned as to fulfil the following qualifications, as certified by the N.P.L.: "The working edges of the blade and stock, which are hardened, are satisfactorily parallel and straight." In which connection we saw, by test, that both sides of the blade edges adhered to the face of a Johansson gauge "Both edges of the blade are square with both faces of the stock to within .0003″, as measured at extremity of blade, and lateral squareness of blade is also satisfactory." And here comes the gist of the matter: "The rigidity of the



Messrs. Moore and Wright's Large Precision Try Square.

square is such that the blade deflects only .0001″ when a force of 1lb. weight is applied to its extremity at right angles to its edge." Further, when the square is held with the stock vertical, the deflection of the blade edge under its own weight is less than .0002″ at the extremity.

The above applies to a square of dimensions:



The New "Pools Major" 4" S.C. Lathe with Automatic Feeds from back shaft.

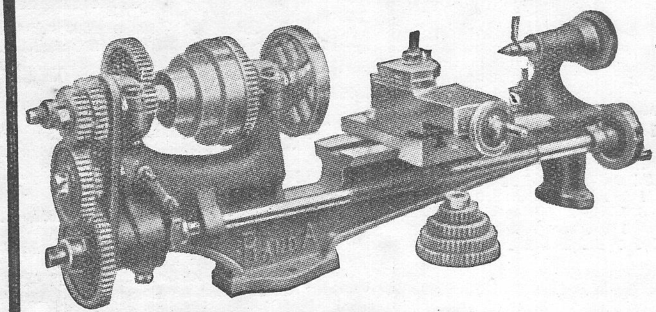
Blade $20\frac{3}{4}'' \times 3\frac{7}{16}'' \times \frac{3}{16}''$, and Stock $10'' \times 2\frac{7}{16}'' \times \frac{15}{16}''$, which corresponds somewhat to the sizes of that in the picture. The point is that the blade, especially, is so proportioned, of I form in cross section, and progressively holed, as shown, that the various bending moments due to its mathematically varying weight and cross section, that deflection, due to its overhanging weight, is reduced to a minimum. One thing is certain; model engineers do not need this accuracy in anything requiring so large a square to test, but the limits attained are an earnest of what these precision tool makers can produce. Squares of sizes within the limits they usually work with, as these good people make to relative accuracy, are really quite inexpensive.

Messrs. Pools Tool Co., Ltd., Carlton Street, Nottingham.

Enterprise is the keynote of this particularly live firm from the Midlands. They exist in the interest of light machine and general hand tools, and their show—which is not new to our's—is usually somewhat arresting in array of detail. We took a photo of their stand, which is reproduced here, and although it is a somewhat difficult photographic subject, both for lighting, situation and colour scheme, a fair idea of its arrangement and scope can be gathered therefrom. Their principal exhibits in the machine tool line are the "Pool" Bench Milling machine, a really correct model single speed machine costin grather over £10; he "Pool" 3" and 4" Special Lathes, which are

Messrs. Pools Tool Co's. effective display at the "M.E." Exhibition.

The "Model Engineer" Guide to PRACTICAL XMAS GIFTS



PLEASE NOTE.

Due to the large sales of the 3″ Randa Lathes, we have been able to save money in production. As our policy has always been to supply only the best quality and most accurate machines at the lowest possible price, we are reducing the price from March 1st to

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$12\frac{1}{2}''$ Between Centres.

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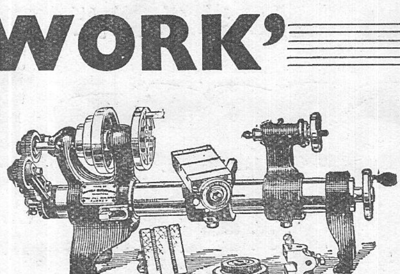

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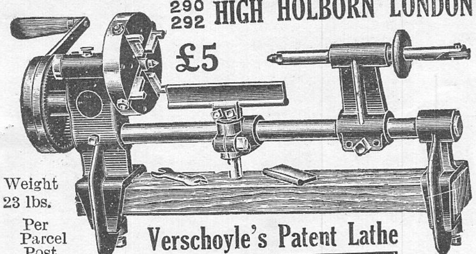

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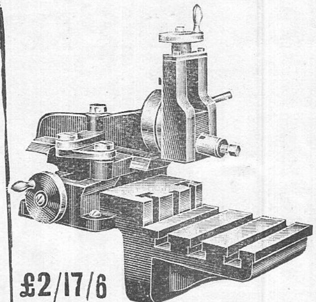

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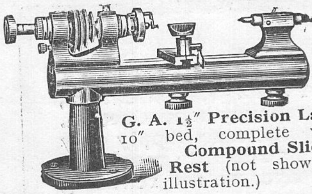
Hand Shaper for Model Maker Stroke, 3½"; 3" Cross Travel of Slide Table 4½" × 4"; 2" Rise and Fall of Table; Vertical Feed of Tool Slide; ¾" maximum distance Tool to Table, 3".



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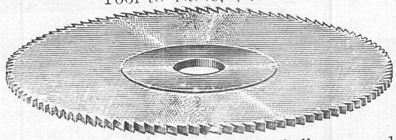
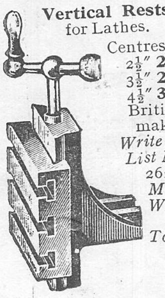
G. A. 1½" Precision Lathe 10" bed, complete with **Compound Slide Rest** (not shown in illustration.)

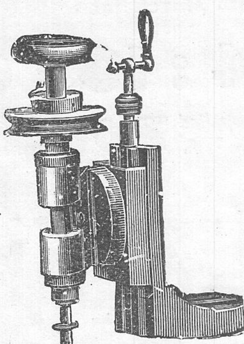


Circular Slitting Saws, hollow ground.

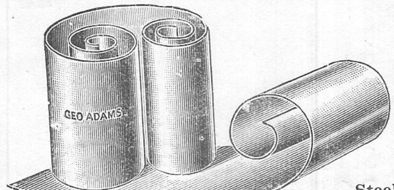
Width mm.	.3	.4	.5	.6	.7	1	1½	2
20 mm. dia.	9d.	9d.	9d.	9d.	10d	10d	10d	11d
30 ,, ,,	10d	10d	10d	10d	11d	11d	1/3	1/7
40 ,, ,,	1/1	1/1	1/1	1/2	1/2	1/2	1/5	1/8
50 ,, ,,	1/3	1/3	1/3	1/3	1/5	1/5	1/8	2/-
60 ,, ,,	1/5	1/5	1/5	1/6	1/7	1/8	2/-	2/4
80 ,, ,,	2/1	2/1	2/1	2/1	2/1	2/4	2/11	3/6



Vertical Rests for Lathes.
Centres 2½" **27/-**
3½" **29/-**
4½" **34/-**
British make.
Write for List No. 262, Metal Workers Tools.

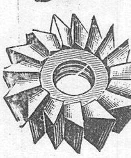


Milling, Drilling and Grinding Spindle, vertical travel 2¾", takes "A" split chucks.
77/6 post 9d.
Angle-Plate for above, **21/-**
Vice for **23/3**

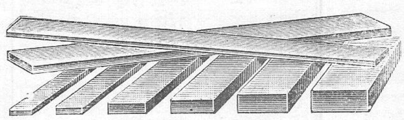


Steel or Brass

Strips of Thin Foil, 2½" wide, 2, 3, 4, 5, 10, 15 thous. in tin boxes. Either metal. Per box **3/-**, post 6d.

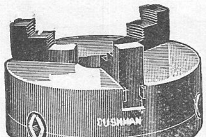


Angular Cutters, ¾" diam.
Angles 50° 60° and 70° tapped ½",
3/- each.

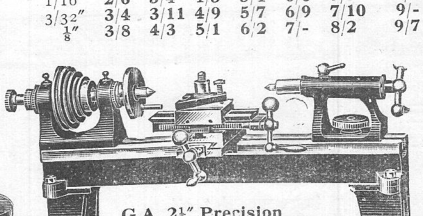


Flat Steel Strips, 18" long, ground dead to size

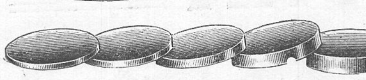
By	1"	1½"	2"	2½"	3"	3½"	4"
1/64"	3/11	5/1	5/11	7/4	8/9	10/2	11/10
1/32"	2/10	3/8	4/9	5/11	7/-	8/2	9/7
1/16"	2/6	3/4	4/3	5/4	6/6	7/7	8/9
3/32"	3/4	3/11	4/9	5/7	6/9	7/10	9/-
⅛"	3/8	4/3	5/1	6/2	7/-	8/2	9/7



Very best quality **Cushman System Geared Scroll Chucks** with 2 sets of Jaws
3¼" 4¼" 5¼" 6¼"
38/- 40/- 51/- 57/-



G.A. 2½" Precision Lathe 2½ in. centres, 20 in. straight bed, **£18**



Brass Circular Blanks.

Diam. By	1"	1¼"	1½"	1¾"	2"	2½"	3"	3½"	4"
1/16"	1d.	1d.	1½d.	1½d.	2d.	3d.	4d.	5d.	7d.
3/32"	1d.	1d.	1½d.	2d.	3d.	4½d.	6d.	7d.	10d.
⅛"	1d.	1½d.	2½d.	3d.	4d.	6d.	7d.	9d.	1/2
3/16"	1½d.	2d.	3d.	4d.	5d.	9d.	1/-	1/1	1/7
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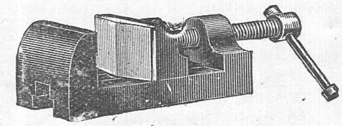

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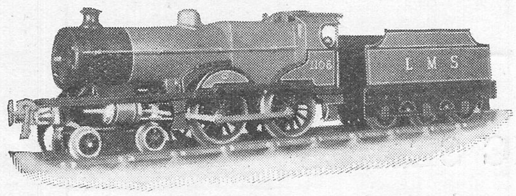

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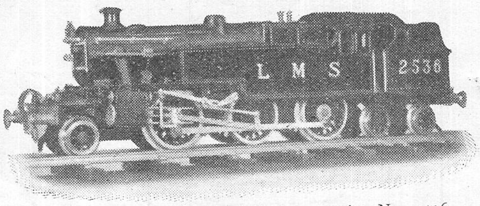

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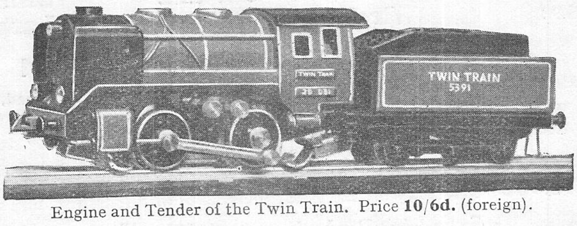

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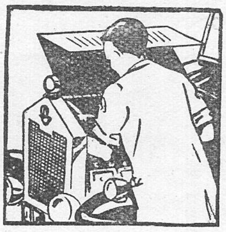

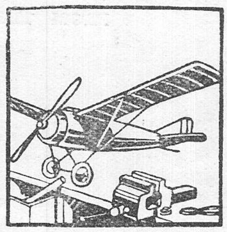

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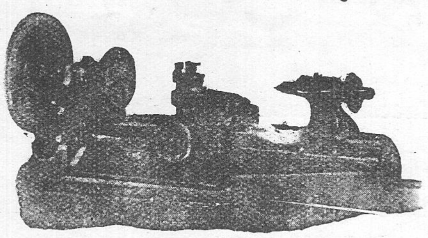

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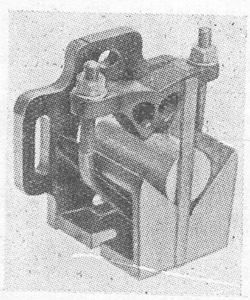

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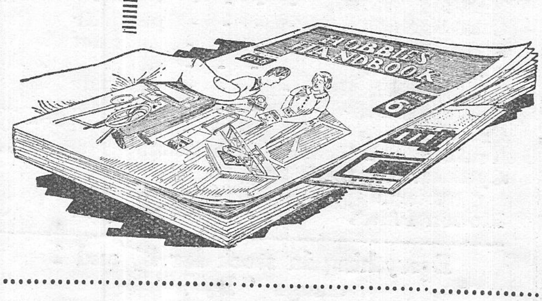
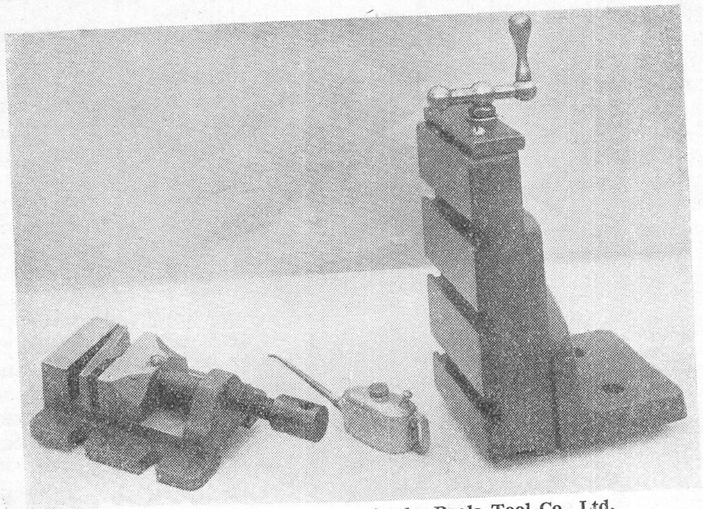


good class screwcutting models, the former is made in a long and short bed form; and the latter, taking 17″ between centres, is a fine type of lathe, costing £11 17s. 6d. in bench form. Both are machines quite well known to readers. A new machine is the "Pool" $\frac{3}{8}$″ 2-Speed Sensitive Drilling Machine, which for the type, is remarkably moderate at 36s. and 52s. 6d. with self-contained countershaft. At the back of their stand (somewhat in shadow in the picture) was a line of shafting, beneath which were mounted, running, several of their lathes for demonstration purposes. The central one of these was the latest type of 4″ lathe, in a particularly long bed form, taking 24″ between centres, a quite new machine. It is defined as the 4″ "Pools Major," and an illustration of it is given here. It is hidden in the stand photo. The main points of this new lathe are that it is fitted with automatic feeds to the sliding saddle traverse and cross slide, both of which are operative from a splined back shaft, and therefore are quite independent of the lead screw. As seen in the photo, the sliding elements of both the saddle (10″ long) and compound rest are very liberal in the matter of surface, and therefore make both for rigidity and accuracy. The following dimensions will give further idea of its capacity: Swing in Gap, $11\frac{1}{2}$″; Swing over Saddle, $6\frac{1}{4}$″; Mandrel Nose, $1\frac{1}{4}$″ × 7 t.p.i. Whitworth form. Finest Auto Feed, about 200 to inch. Taper bore at both centres, No. 2 Morse. Clearance bore at both Spindle and tail barrel, $\frac{5}{8}$″. Width of bed, $4\frac{1}{2}$″. Traverse of both cross and top slides, $4\frac{1}{2}$″. Height of centre above tool plate, $\frac{3}{4}$″. Lead screw, $\frac{7}{8}$″ × 8 t.p.i. There are 13 cut change wheels, cluster gear, and a special constant mesh back gear, clutch operated. The main head bearing is $2\frac{3}{8}$″ long, and tail bearing, $1\frac{3}{4}$″. This is not all, but there is sufficient to realize that this "Major" tool is both up to date, and of regular workshop quality, though again moderately priced at 24 Guineas, in bench form. The main construction and form of bed are seen in the photo. Heavy countershafts for both direct drive, or fitted with F. and L. gear, cost 42s. 6d. extra each, and the necessary jaw and drill chucks are provided at standard prices. This appears to us as one of the most tempting offers in the higher class lathe market yet offered to modellers in general. The general performance of the tool, as demonstrated under power drive on the stand, was of an order suggesting that it would be useful for manufacturing purposes, and, therefore, its price, which to some may appear on the high side, is really quite in keeping with its quality and capacity.


Some light tools and accessories by Pools Tool Co., Ltd.

The smaller tools on this stand were of the usual useful range, upon which it is not possible to particularize. There were one or two inexpensive accessories which were new to us. A photograph reproduced here shows a handy machine vice, with a swivelling adapting edge to the moving jaw, on the left; a simple form of vertical slide on a swivelling angle plate, which is offered at a quite negligible price as compared with the general run of these accessories, on the right, and, in between, is seen a miniature engineers pattern valve control oil can, which can, from its size and complete construction, be regarded as a working model.

(*To be concluded.*)

First Steps in Model Engineering.

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By "INCHOMETER."

Back Geared Lathes.

By request, a note about back geared lathes, induced through a friendly expressed communication, from which I quote the following: "Can you in a future article, give a few words to us folks, who are familiar with the plain lathe, but have not had much experience of the back geared variety?" This correspondent is considering to buy a back geared lathe, but is doubtful about learning to handle it, particularly in regard to cutting speeds. It may seem strange that one who, evidently by his letter is a model engineer having considerable experience with using a plain lathe, should be doubtful as to his understanding of, or learning the management of "back gear." During the year, and more, along which I have been writing "First Steps," my perspective of the technical grasp and knowledge obtaining with beginners and the moderately experienced has widened, I have found evidence that there is a need for very simple and almost obvious explanations. It has come through actual conversations and requests in letters, and is a reminder to me for keeping the "Kindergarten" class prominent in my contemplations.

My correspondent of the moment enquires "is the back gear always used for metal turning, the slower speed being balanced by taking a deeper and heavier cut?" He seems to be confused as to the meaning of the term "cutting speed," and, in common with some other amateurs, to expect that mechanical work and manipulation must be according to exact rules and procedure. For example, read this sentence from his letter: "My idea is that the slowest speed obtainable with back gear in, would be used for cast iron or cast steel work, the middle speed for mild steel and the high speed for brass and similar metals." He is puzzled by the slow speed (50 revolutions per minute) of the mandrel, compared to the 300 revolutions per minute of the countershaft.

Use of the Back Gear.

Cutting speed in lathe work of turning and boring is generally expressed by feet or inches, and not by revolutions, per minute. It is a surface rate of travel. With any given material, and to obtain a rated cutting speed, the revolutions per minute will depend upon the diameter of the circle being turned or bored. If the cutting speed is to be, say, about 30 feet per minute, and the piece being turned six inches diameter, the required speed, as revolutions, would be approximately 20 per minute. But if the diameter is $\frac{1}{4}$ inch, the required speed would be about 475 revolutions per minute for the same material. To obtain the low number of revolutions, you would have the drive upon the cone pulley diameter which gives the nearest result. For the high number of revolutions, you would not couple in the back gears, but drive the mandrel directly from the cone pulley, the belt being upon the diameter which will give nearest result.

Some Old Time Cutting Speeds.

The following are given in "Molesworth's Pocket Book of Engineering Formulae," about 50 years ago. Speeds for cast iron generally, 150 to 190 inches per minute, boring 80 inches per minute. Speeds for wrought iron, about 260 to 280 inches per minute; for yellow brass, about 300 inches per minute. Speed of planers, about 15 feet per minute; of shapers, about 12 feet per minute. For drilling, tapping or boring, speed of circumference of tool, 80 to 100 inches per minute in cast iron, and from 140 to 160 in wrought iron. Speed for turning chilled rolls, 3 feet per minute; rifling steel guns, $3\frac{3}{4}$ feet per minute; boring cast guns, 4; rifling bronze guns, 20; screw cutting in steel, $7\frac{1}{2}$; drilling steel small arms, 30; drilling gun metal, 100 feet per minute.

With the development of tool steels capable of working at high temperature of the cutting point and edges, cutting speeds and quantities of material removed in a given time or at given rate have been increased. More driving power is required, and lathes or other machine tools to be designed of greater power and strength of construction, to permit the tools being used to their full cutting ability.

You will find particulars of present day cutting speeds given in engineering pocket books, and treatises on lathes and workshop practice. If you care to calculate approximate speeds in revolutions per minute, which will give cutting speeds expressed in feet or inches per minute, to correspond with either present day or old time practice and for various materials, you will obtain some notion of the mandrel or cutter revolutions per minute to use. For home workshop purposes, the old time speeds are the more suitable, both for your lathe and tools, and comfortable manipulation. By experience, however, you will not be likely to concern yourself with feet and inches, or definite revolutions per minute. Depth of cut, amount of feed travel of the tool, variation of hardness, toughness and characteristic of any particular casting or sample are disturbing factors. With practice and trial, you will acquire intuition; it will become second nature to you, in deciding if the back gear is needed, and the speed, amount of cut and rate of tool travel giving best results.

Mechanism of the Back Gear.

The term "back" is derived from the intermediate shaft and gears being usually situated, behind the headstock, for convenience and safety. It could be placed above or in front, so far as actual working is concerned. Sometimes the entire arrangement is contained within the cone pulley. This is termed "internal gear," or occasionally, "internal or inside back gear," a misnomer, but directly informative for general conversation. In the normal back gear, a small diameter toothed wheel is fixed to the cone pulley, and engages with one of larger diameter fixed upon a shaft. At the other end of this shaft a small diameter, toothed wheel is fixed, engaging with one of larger diameter fixed upon the lathe mandrel. In action, the cone pulley runs free upon the mandrel, and its gear drives the back shaft at a reduced number of revolutions, because the gear is a small one driving a larger gear wheel. The small gear on the shaft, running at the reduced speed, drives the gear fixed to the mandrel and, for the same reason, effects a second reduction of speed.

Connecting in Plain Gear.

For "plain" or single gear working, the cone pulley is fixed to the mandrel, and the back gear is put out of action. A locking arrangement is provided, and by this, the cone pulley can be locked fast to the mandrel, or, at the operator's will, allowed to run free. If the lock should be in engagement, and the gears are also in connection, the mandrel cannot revolve. The whole affair is held fast. For the mandrel to revolve, the gearing must be set with its teeth free of engagement; in effect, the gears which are on the back shaft are moved away from those on the cone pulley and the mandrel. Two methods are in general use; the back shaft may be moved directly away or be slid lengthways, by an amount to separate its gears from engagement with the others. The two sections of gearing are thus separated, and the mandrel will be free to revolve. Depending upon the method used by any particular maker, a device is incorporated for the purpose of retaining the shaft in its set position, so that the gears cannot accidently come again into engagement. To put the back gear into action, unlock the cone pulley and adjust the gears into engagement.

LOCO. PROTOTYPES NEWS and NOTES

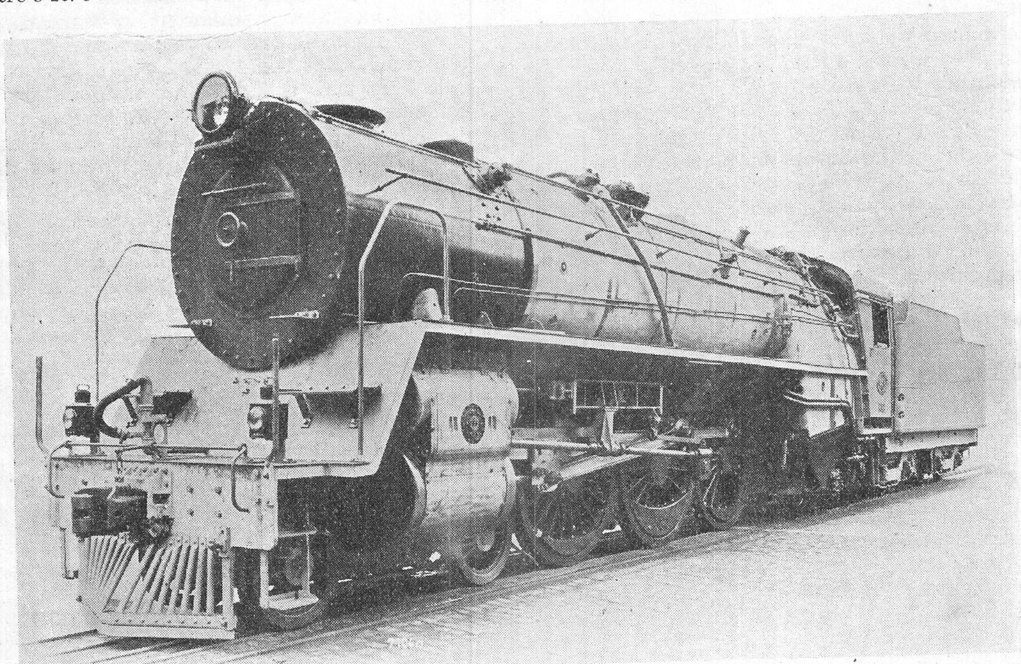
By CHAS. S. LAKE, A.M.I.Mech.E., M.Inst.L.E.

Some Remarkable Locomotives for South Africa.

Six locomotives, of a new design, intended for express passenger service on the South African Railways, have recently been completed by the firm of Henschel & Sohn A.G., of Kassel, Germany. These, as the illustration reproduced shows, have the 4-6-2 wheel arrangement. They have been constructed to the designs and specification of Mr. A. G. Watson, the chief mechanical engineer, and will be used principally on the Cape Town-Johannesburg main line service, involving a total distance of 617 miles.

The locomotives have such proportions as would justify their being considered on the large side for the standard 4 ft. 8½ in. gauge, whilst for the 3 ft. 6 in. gauge on which they will operate, they are outstanding in this respect. The boiler, which has a diameter at the leading end of 6 ft. 4 in., is placed with its centre 9 ft. 3 in. above the rails, a very advanced admission valves are 8 in., and the exhaust valves 9 in. in diameter. The connecting and side rods are made from forgings of special chromium nickel-alloy steel, designed to be as light as possible consistent with strength, and the provision of proper bearing surfaces for the main crank pins and coupling rod pins.

Grease lubrication is used for the motion and the axleboxes of the coupled wheels. Considerable care has been taken in regard to the balancing of the engine, the balanced cranks cast in the wheel centres being hollow, and formed in such a way that they may be filled with lead centres to balance the revolving masses, and either 20, 30, 40 or 50 per cent. of the reciprocating parts, as may be proved in practice to be required for satisfactory running. As delivered, the reciprocating parts are balanced to the extent of 20 per cent. of their weight. The tyres for the main driving wheels are flangeless.



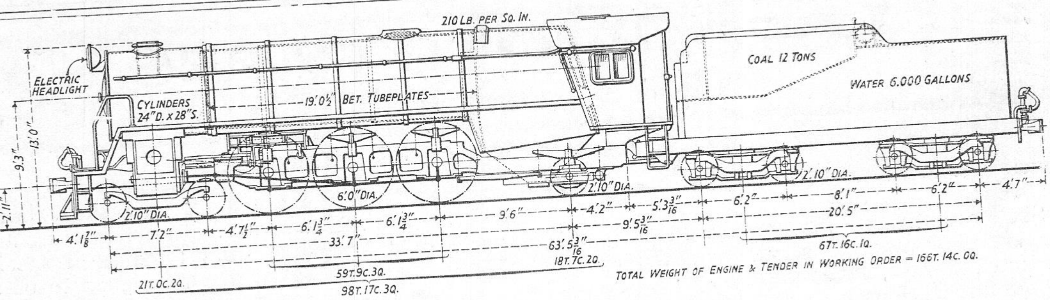
One of the new 4-6-2 locomotives for the South African Railways.

figure for the 3 ft. 6 in. gauge. The boiler is of large proportions, having a total heating surface of 3,534 sq. ft., and a grate area of 62 sq. ft.; these again being remarkable figures in the circumstances.

The cylinders, two in number, are placed outside the frames and drive the middle pair of coupled wheels, steam distribution being effected by poppet valve mechanism of the latest design. Each cylinder is cast with a half saddle supporting the circular smokebox. The whole of the cam shaft and operating gears are lubricated by an oil bath. The

The following are the principal dimensions :—

Cylinders, diam. and stroke ..	24″ × 28″
Wheels, diam. leading bogie ..	2′ 10″
,, ,, coupled	6′ 0″
,, ,, trailing truck ..	2′ 10″
Wheelbase, engine total ..	33′ 7″
,, coupled	12′ 3½″
Boiler heating surface :—	
Tubes and flues	2,701.5 sq. ft.
Arch Tubes	26.5 ,,
Firebox	212.0 ,,
Total evaporative	2,940.0 ,,
Superheater	594.0 ,,



Details of the new South African Railway locos.

Grate Area	62.0 ,,
Steam Pressure	210 lb. per sq. in

In working order, the engine weighs 98 tons 17 cwt. 3 qrs., of which 59½ tons are available for adhesion. The tender, which has a capacity of 12 tons of coal and 6,000 gallons of water, weighs, in working order, 67 tons 16 cwt. 1 qr., giving a total weight in working order, for engine and tender, of 166 tons 14 cwt.. The rated tractive force of the engine is 35,572 lb.

The first engine of the new class, number 854, soon after it arrived at Cape Town made an experimental run over the main line to Wellington and back with a train of eight bogie vehicles weighing 277 tons. It was run in easy steam on the outward journey, but on the return trip, it reached a maximum speed of 70 m.p.h. on the level which, it may be assumed, is a record for the 3 ft. 6 in. gauge.

A Rebuilt "Royal Scot."

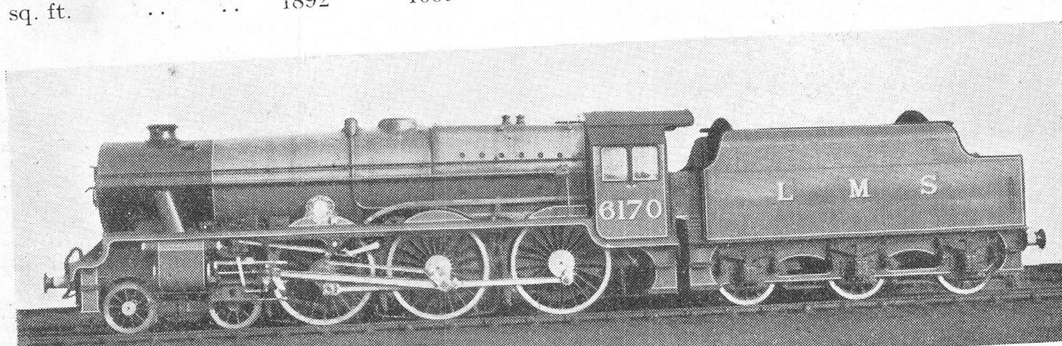
Engine No. 6170 of the "Royal Scot" class named "British Legion" has just been turned out of the Crewe Works of the London, Midland & Scottish Railway fitted with a taper boiler, whilst various other recent developments of design have been incorporated. The boiler differs from the others of the tapered formation on the L.M.S. Railway, in being provided with a steam dome, in which the regulator is placed. There has been a re-distribution of the heating surfaces as compared with the standard "Royal Scot" boiler, and the figures below show how this has been effected :—

Boiler	Original Royal Scots	Engine No. 6170
Working pressure lb. per sq. in. ..	250	250
Firebox heating surface sq. ft.	189	195
Tube heating surface sq. ft.	1892	1669
Superheating heating surface, sq. ft. ..	399	360
Combined heating surface, sq. ft.	2480	2224
Grate area sq. ft. ..	31.2	31.25

The cylinders are of the same diameter, and arranged as in the original "Royal Scot" engines, but have been modified in order to provide a saddle casting to carry the smokebox, in view of the fact that the tubeplate is now of the drumhead type.

It will be noted that the front end of the engine has now a different appearance, the smokebox being carried further forward, with the result that the vertical centre line of the cylinders and that of the chimney do not coincide, whilst the main steam pipes to the outside cylinders are at an angle, instead of being straight, as before. The tractive effort of the locomotive remains as originally planned, and is 33,150 lb. at 85 per cent. boiler pressure, the latter being 250 lb. per sq. in. There are three cylinders 18 in. by 26 in., and the coupled wheels are 6 ft. 9 in. diameter. The engine by itself weighs the same as before, but owing to the fact that the new type tender has a higher water and coal capacity, the total weight of the engine and tender is increased, being now 139 tons 11 cwt., as compared with 127 tons 12 cwt. The tender carries 4,000 gallons of water and 9 tons of coal.

The appearance of the engine has, in the writer's view, been improved by the fitting of the tapered boiler and a more prominent type of chimney, and by the re-arrangement of the front end. It is intended to rebuild other engines of the "Royal Scot" class in the same manner.



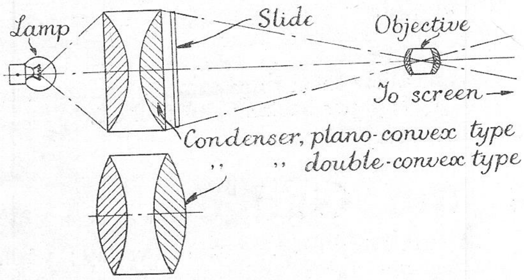
The rebuilt L.M.S. "Royal Scott" No 6170.

A Simple Miniature Projector.

By F. R. WATTS.

An old detachable head motor cycle cylinder and piston suggested to the writer the possibility of conversion to an optical lantern or enlarger, and, after a little scheming and work, the result shown was evolved.

For the metal and wood portions, a few feet of $\frac{5}{16}''$ mild steel rod the size of the holes in the cylinder, a foot of brass tube, $\frac{5}{16}''$ bore and $\frac{1}{16}''$ wall, eight $\frac{5}{16}''$ nuts, about nine inches of $\frac{3}{4}'' \times \frac{1}{16}''$ strip brass, half-a-dozen $\frac{1}{16}''$ diameter



Optical system of miniature projector.

split pins, and some four-ply wood were obtained, together with a suitable piece of oak for a base.

The steel rod was cut into equal lengths, the ends squared, and the requisite portions screwed $\frac{5}{16}''$ thread. Next, the distance from the bottom of the flange on the cylinder to the upper end of same was measured, the thickness of three sheets of plywood, an inch for a brass collar, and $\frac{1}{4}''$ or so for nut adjustment added to this. and $\frac{1}{16}''$ holes drilled diametrically through the rods this distance from the end of the screwed portion.

Other holes were drilled in the plain ends to hold pins which would prevent the front being pulled off.

Following this, the brass tube was cut into eight pieces, four about two inches long, and four about one inch in length, these pieces being afterwards faced in the lathe and brought to sets of $\frac{3}{4}''$ and $1\frac{3}{4}''$ tubes.

The plywood for the fixed front was roughly cut to the outline of the cylinder, allowing about $\frac{1}{8}''$ for "cleaning up," the cylinder placed on end as nearly central as possible, a rod threaded through the holes with its plain end resting on the plywood, and a light tap given to the other end. This located a hole, which was drilled $\frac{5}{16}''$, the wood replaced under the cylinder and the rod forced into the hole. Another rod was placed in position and given a light tap, and, on the hole being drilled, was pushed into position as in the case of the first rod. Rods three and four were dealt with in the same way, and all the holes in the plywood fronts were marked out by this method.

Lines drawn through the centres of diametrically opposite holes located the centres for the large hole in the fixed front, and that for the lens in the sliding front.

The slot for the slide or carrier was formed by inserting two pieces of plywood of suitable thickness, with their inner edges parallel to, and equidistant from, the diameter of the bore.

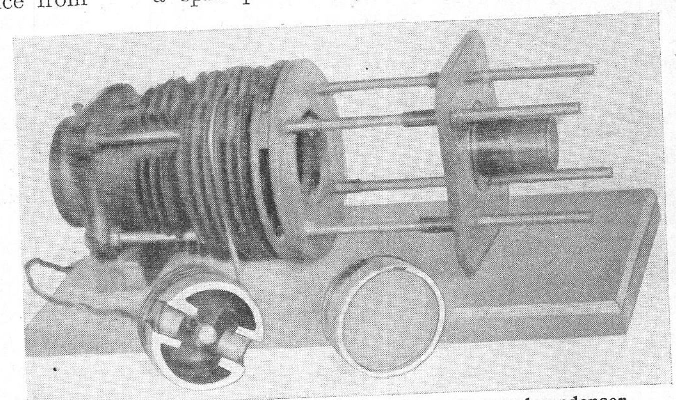
A piece of the strip brass was placed across the ready drilled sliding front, and one of the $\frac{5}{16}''$ holes located on it. When drilled, it was pegged to the wood with a short piece of $\frac{5}{16}''$ rod and the other hole drilled.

A second strip was dealt with in the same manner, and a few holes for countersunk wood screws put in each.

The holes in the sliding front and the brass plates were now opened out to $\frac{7}{16}''$ diameter—the outside diameter of the tubes—and the ends of the tubes and a space around the holes in the plates cleaned up.

When assembling, the cylinder was placed with the square flange at the bottom, a rod passed downwards till the screwed portion was just above the flange, when a nut was screwed on as far as possible—using fingers only—and the remaining threads passed through the flange to receive another nut.

When all the rods were in position, the fixed front was threaded over them, and pushed into place. Next a $\frac{5}{16}''$ washer was placed on each, then the brass sleeves—$\frac{3}{4}''$ ones—and finally a split pin through each hole. The bottom



The complete projector, showing lamp mounting and condenser.

nuts were tightened up, and the inside ones screwed down to the flange, making a very firm job.

The four long brass sleeves were now slipped on the rods, the sliding front and its brass strips threaded over them and packed parallel to the fixed front, leaving about $\frac{1}{16}''$ of the sleeves projecting through the holes in the strips.

A little flux, solder, and a hot bit soon fixed all in position.

Having completed the body, the condenser and lighting were next taken in hand.

The aluminium piston was sawn through across the gudgeon-pin holes, and each sawn edge faced up.

The centre-pop in the head was used to locate

a drill, which served to determine the position of the spot-light bulb.

Lenses for the condenser were obtained at a cycle stores, and are held in the skirt of the piston by sprung-in wire rings. The thick centred short focus ones are best.

Some of the older cars carried side-lamps fitted with plano-convex lenses, which would be ideal for the job.

If used as a lantern, almost any positive lens of three to six inch focus will do in the sliding front.

The instrument is so satisfactory, however, that possibly constructors may think it worth while to equip it with good quality lenses and use it as an enlarger for the popular miniature cameras.

In that case a bellows must be fitted, or the light screened in some way. As a matter of fact, an inner tube from a car wheel will answer quite well.

By placing compression springs on the rods between the two fronts, threading the end of one rod and placing a sleeve and nut on it, screw focussing can be obtained.

There are plenty of these cylinders to be obtained from garages and scrap dealers, varying in bore from $2\frac{3}{4}''$ to $3''$. The only drawback is the weight.

A simple way of securing the cylinder to the baseboard is by means of a $\frac{3}{16}''$ steel rod, screwed at each end, bent to the outline of the cylinder between the fins, passed through the baseboard and nutted.

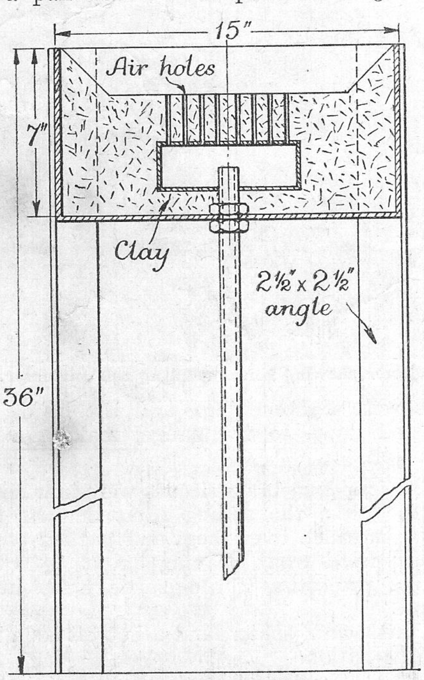
Excellent children's slides can be made as follows: Obtain strips of glass the requisite width, thinly coat one face with gold size, and allow half an hour for "it to become tacky." Press cheap transfers firmly on to this and allow them to remain for five minutes. Damp the paper backing and peel off.

Workshop Hints and Gadgets.

Short original and practical contributions to this page are invited from readers, and will be paid for. Write on one side of the paper only; address items to the Editor of THE MODEL ENGINEER, *and mark envelopes "Workshop Hints."*

A Simple Forge.

A cheap and handy forge which I have just constructed is shown in the illustration. It consists of an old piece of sheet-iron beaten into a pan about 7″ deep. Four angle iron



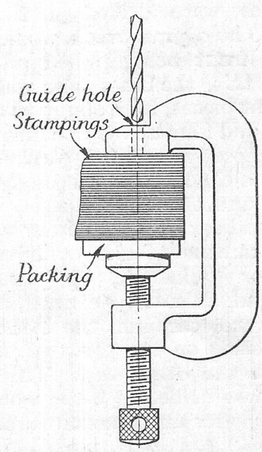
legs are bolted to this to bring it to a working level, and through a hole in the pan bottom is brought the air pipe, which is secured by two nuts. Pressed over the pipe end, is a circular toffee tin, in the top of which is a number of holes.

Around everything is packed fireclay; when putting the clay in, nails or wires should be run from the can holes and out of the clay, so as to leave holes in the clay also. The holes in the writer's forge are $\frac{3}{16}''$, and the air pipe is connected to an old pair of bellows, which is secured to the floor and worked by the foot. The fireclay can be dished in the middle as shown.

SIMPSON GRANT.

Drilling Laminations.

In drilling transformer stampings or similar sets of metal strips, where the holes must correspond exactly, the best way is to clamp them together in a pack. I found it very difficult to hold them close enough to the hole being drilled until I adopted the method



shown in sketch. An ordinary clamp is used, with a hole drilled through the jaw to act as a jig, a step being first filed on the sloping rib of the jaw, so that the drill starts truly. The moving jaw of the clamp is protected by a piece of wood or ebonite packing.

J. KIRK.

Model Aeronautics.

Lancashire Model Aircraft Society

THE results of the Leeming Cup Contest, held in October, in which models were required to make three hand-launched flights with an average duration nearest to 45 seconds, proved of sufficient interest to merit a further contest being held on similar lines, as announced in the "M.E." Diary recently.

The Lancashire Aero Club Cup was also flown for on the same day, and resulted in a further win for Mr. Kenworthy's "Conqueror." Its second win in this annual event.

The highest average duration of three hand-launched flights produced the following results: J. W. Kenworthy, "Conqueror," 112.87 secs.; C. S. Rushbrooke, "Mayfly," 69.6 secs.; C. E. Ewart, "Ace," 50.93 secs.

Weather conditions were very changeable during the afternoon, with rain, hail and snow causing several interruptions to the contests, but although the air was cold, and "lift" practically nil, wind was only slight, and as a result the models were flown under fairly uniform conditions, and durations represented their power flight and ultimate glide.

Members should note that outdoor flying meetings are to be held each Sunday throughout the winter months when weather permits. The meeting for the first Sunday of each month will be held at the Manchester Airport, and on remaining dates, Ash Farm, Ashton-on-Mersey, will be used. All meetings start at 2.0 p.m.

Aeromodellists who may contemplate joining the Society will be welcome at any meeting to be held at the Airport. Further details regarding subscriptions, etc., can be obtained by writing to the Hon. Secretary, Mr. C. S. Rushbrooke, Innsbrook, 14, Ennerdale Drive, Ashton-on-Mersey, Sale, Cheshire.

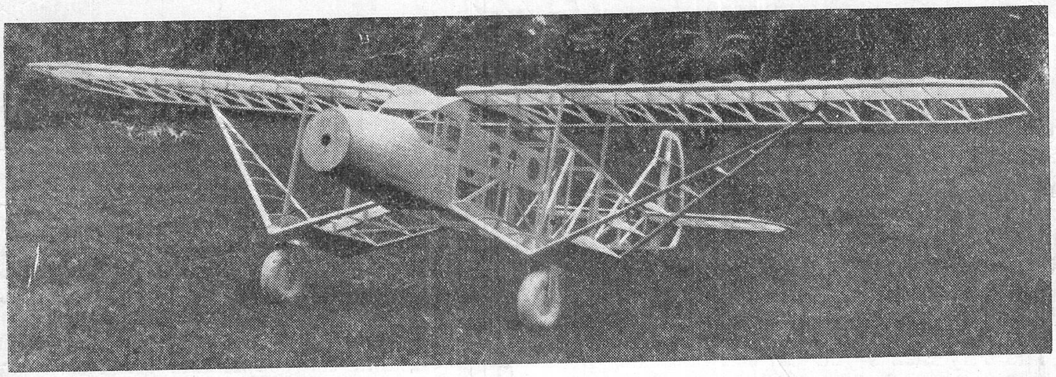


Photo by] [*J. Pearce*

Three quarter front view of Mr. C. E. Ewart's "Bellanca" flying scale model, before covering.

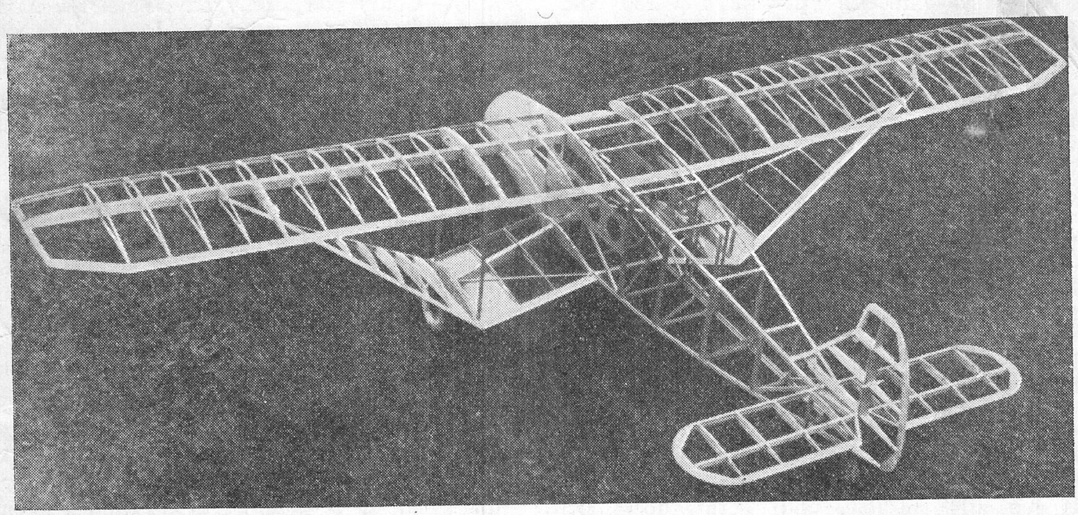


Photo by] [*J Pearce*

The skeleton of a flying scale model "Bellanca" plane built by Mr. C. E. Ewart of the Lancashire Model Aircraft Society. The wing span measures 68 ins., and the total weight of model as photographed is 10 ozs. Balsa wood of L, H and T sections has been used extensively in the construction of this interesting model, which, when completed, will be powered with a rubber motor.

Results for the Leeming Cup were as follows—

Entrant	Model	Wt.	Span	Flights			Average	Position
J. W. Kenworthy	" Conqueror "	3.5	52″	52.5	56.9	26.0	45.13	1st
J. Pearce ..	" Cirrus IV."	6.5	40″	50.5	34.0	52.1	45.53	2nd
C. E. Ewart ..	" Ace "	5.12	46″	37.5	42.0	48.6	42.7	3rd

QUERIES and REPLIES

Querists must comply with the Conditions and Rules given with the Query Coupon in the Advertisement Page of each issue.

6,702.—Pittler Lathes.—S.B. (Kendal).

Q.—I have recently purchased a second-hand Pittler lathe, and several parts seem to be missing. Could you inform me who are the English Agents, and if spares are still obtainable, also have you ever described these lathes, or any accessories for same, in the " M.E." ?

A.—The Pittler lathe, of German manufacture, has for many years been off the market, and is not now made.

The only means you have of obtaining the missing parts or new fittings is to watch advertisements in " The Model Engineer," or to insert a " Wanted " advertisement. It may be that an example might be offered containing what you need, but the likelihood is not very promising.

We should, long since, have written quite a lot on the possibilities of this lathe, were it a going concern, but examples are now so rare, and the information of use to so few, that it would be a waste of space.

6,817.—Cause of Commutator Blackening.—A.P. (Muswell Hill, N.)

Q.—I have recently purchased a 230 volt direct current ¼ h.p. compound wound motor, with which I am driving my workshop. After skimming up the commutator, it runs perfectly without any undue sparking at the brushes, but after a few minutes the commutator begins to blacken. I shall be glad if you can explain the cause and how to remedy it.

A.—There are various things which may contribute to blackening of the brush track on the commutator, but the most likely is the use of brushes of too soft a grade of carbon, which leads to a heavy short-circuit current, across the contact face of the brushes between the segments they cover. This cross current can be restricted by substituting a grade of carbon having a higher contact resistance, and we recommend you to try this first of all. On high voltages, such as 230 volts, the quality of brush known as " Link A" supplied by The Morgan Crucible Co., Ltd., of Battersea Works, S.W. is generally suitable, and if this does not altogether cure the trouble, try a harder grade still, such as " C/4." Make sure the brushes fit freely in the holders, and that the brush springs feed properly without sticking. Information on subjects such as these will be found in our Handbook " Electric Motor Management," by A. H. Avery. Should trouble still be experienced after trying out different grades of brush, we should advise you to carefully undercut the mica insulation between the commutator bars to a depth of $\frac{1}{32}$ in., taking care to completely remove all burrs left in the process, and smoothing up the surface again with fine glasspaper. Emery should never be used on the commutator, as it tends to become embedded in the copper and grind away the brush faces. Commutators naturally do not maintain a perfectly clean metallic surface under the brush track, but are usually glazed, with a bluish brown appearance, when in good order. Blackening is invariably a sign of trouble.

Business Enquiries and Replies.

Mountings for Model Steam Boiler.

Q.—Could you kindly advise me the name and address of any firm where I could purchase the necessary mountings for a model steam boiler of the marine and vertical type.

A.—Stuart Turner Ltd., Henley-on-Thames ; Bassett Lowke Ltd., St. Andrews Street, Northampton, and Bond's o' Euston Road.

(Newcastle, 871.)

" Crackle " Paint.

Q.—I have a small model which I wish to finish with " crackle " paint to improve the appearance of the metal parts. I shall be pleased if you will inform me where I can obtain some of this paint.

A.—W. Canning & Co., 77, St. John Street, London, E.C.1 ; Imperial Chemical Industries Ltd., Millbank, S.W.1.

(Harrow, 872.)

Pump and Motor for Fountain.

Q.—Can you inform me where I can obtain a centrifugal pump and electric motor suitable for operating a small garden fountain about 15 ft. in diameter ?

A.—A. W. Gamage & Co. Ltd., Holborn, London, E.C.1 ; Whitney & Co., 129, City Road, London, E.C.1.

(Wilmslow, 873).

PRACTICAL LETTERS from OUR READERS

Another "Dyak" Prize Offered.

DEAR SIR,—I have "listened" with interest to what the powers that be have had to say about the "Dyak" competition. I, too, was told at different times that the trophy should have been given for open competition, or perhaps for more advanced work. Well, the main thing that first prompted the offer was the encouragement of beginners, and although the number of actual entries was small, this was no guide to the number of "Dyaks" that were attempted as first efforts, and having the means of at least getting a rough estimate of the total number of "Dyaks" "on the stocks" when the competition closed, I can at least thankfully say that the main reason for giving the trophy was fully justified.

Nobody can have any idea what a tremendous amount of time, care, patience and hard work is involved in the making, to a successful passenger-hauling conclusion, of a model locomotive, except those who have done it; and I am happy to be able to number myself among that honoured brotherhood.

So far as the design of the "Dyak" is concerned, I must confess that I have not a single bone left to pick. If makers caused their guard irons to foul the rails, this surely pointed to deviation from the blue-print measurements. I do not agree that the distance from the pin to the axle of the front bogie was too small, but here I must confess that my opinion, as a personal one, is really confined to knowing the "Dyak Queen" herself, and after all, it was her points that were supposed to be copied. Whatever blame is attaching to the reverse arrangements, I do not hold "L.B.S.C." guilty. Much as I personally dislike controlling reverse levers with patent gadgets, charm they never so wisely, one has only to sit behind a two-and-a-half gauger on a somewhat precarious truck with a passenger or two behind to appreciate ease of handling, especially at either end of the track; but there were several ways of getting over the difficulty, one of which was thought out, and applied by, the trophy winner.

Like "L.B.S.C.," I took no part in the judging of the competition, although I was there during the steam trials of the winning "Dyak," and watched the proceedings with great interest. I was more than gratified that the trophy went to Norwich, as I happen to be, as you know, a member of that young but flourishing Society.

During the Exhibition, I examined every one of the entries most carefully, ignored the notices which said "please do not touch," and had a "pit" examination as well. I should like to tell the owners that my impressions are these. Firstly, I should like to (and hope I will) see every one of them again. There was not one of them but what, with certain improvements and alterations, could be every whit as good as the entry which carried off the prize. I should eschew both paint and high polish on the metal work. I should note "L.B.S.C.'s" remarks recently made about the "small things which count," and get to work accordingly.

Finally, to all the "tukans eban" extant, (and in Malay that means "workers") in "Dyaks," the competition, with your kind permission, Mr. Editor, goes on; I wish to offer a silver cup (like the "Borneo" edition) for the next best "Dyak," and other prizes are, I understand, to be given by friends "L.B.S.C.," and Mr. G. Kennion.

Plenty of time is available, and it is suggested that steam trials be given to one and all, in good time, so that the prizes and finalists and runners up will be able to make their jungle call at the next "M.E." exhibition.

To revert to my opening remarks, there are handsome prizes given each year at the Exhibition for open competition and more advanced work, and those who tackled the "Dyak" as a first effort will feel that they are now able to go ahead and tackle something more advanced. Like myself (and a host of others, I expect), they will be able to look back on things made three and four times over before success, or rather satisfaction, came; and armed with that knowledge which only experience can bring, they can surely tackle with more confidence that "something" which they, in common with all model engineers, must have at the back of their minds.

Yours very truly,

London, W. GEO. R. STEVENSON.

(While we think everybody will appreciate the generosity of Mr. Stevenson in offering a special cup for another "Dyak" competition, and equally generous offer of prizes by other donors, we ourselves, as organisers of the "M.E." Exhibition, are not prepared to accept the responsibility of framing the conditions, or of carrying out the tests, or of judging the finally selected entries. The idea of a further competition was originated by "L.B.S.C.," and if there is sufficient evidence of a desire among "Dyak" builders to enter their locomotives, we shall be pleased to give full publicity to such arrangements as may be made, and to provide space for showing the winning models at the next "M.E." Exhibition. Beyond this, we must leave the details of the organising and judging of the competition in the capable hands of "L.B.S.C.," who, we understand, is inviting prospective competitors to communicate with him.—ED. "M.E.")

To Gloucester Readers.

DEAR SIR,—I am anxious to get acquainted with any enthusiasts in Model Aircraft or any kind of model engineering in my locality, and should be greatly obliged if any readers who are interested would communicate with me at the address given below.

62, Bibury Road, Gloucester. Yours faithfully, E. V. EASTHOPE.

Model Loco Standards of Performance.

DEAR SIR,—I should like to correct any false impression your correspondent "B.H.P." may have given by his remark that my recent letter "reads more like a contribution to the old steam versus I.C. controversy." To my mind, such a controversy is as absurd as it would be to enquire solemnly into which was best, a hammer or a screw-driver—to which the only intelligent answer is: "it depends upon what you want to do with it."

What I was getting at was that the almost exclusive use of I.C. for motor-cars and road transport generally leads many of the less well-informed and less deeply thinking to suppose that it has some especial merit for such work; from which it is but a step to the false inference that the methods by which its performance is commonly judged MUST be equally applicable to other engines of locomotion. In point of fact, the I.C. engine is particularly unsuitable as an ideal traction motor, because of its limited flexibility. The only thing to commend it is its ability to start at once from cold, without any waiting to get up steam. If a super-inventor ever comes along with an instantaneous steam generator which also possesses a sufficient steam reserve, I venture to predict a wholesale reversion to steam on the common roads. "B.H.P." seems to be largely in agreement with me over the general thesis expressed in this paragraph.

I do not follow his argument that the I.C. engine offers greater problems in respect to brake testing than does the steam engine—I should have said very definitely the reverse to be the case. The greater the flexibility of the engine under test, the greater demand for flexibility in the brake, if the results are to be worth anything. A brake test is usually conducted over a long period of constant steady running, a condition not likely to be realised much in practice in the case of a direct coupled traction motor, such as a steam locomotive. The motor car engine is a different story altogether, because it runs at a more or less constant r.p.m., the flexibility at the driving wheels being obtained through the intervention of gearing. I had this in mind when I drew attention to the ubiquity of the gear-box as a universal adjunct of the I.C. engine in traction work.

"B.H.P." states that "the marine steam engine has the same power characteristics as the locomotive," and that "the same applies to the (steam) stationary engine." I would point out that the demands made upon the flexibility of both are considerably less than the demands made upon the flexibility of the steam locomotive. Marine and stationary engines are designed for a given power output at a given r.p.m.—which, from the brake testing point of view, puts them nearer to the category of the I.C. engine than to the steam locomotive, designed to haul a given load over a given road. The very fact that brake testing has for many years been customary for marine and stationary engines, whereas it has only just come in for locomotives as a yet unproved experiment, supports my contention that brake testing is particularly applicable to engines like I.C. engines, designed and built for a given power output at a given r.p.m., and that it is not well suited to the assessment of locomotive performance.

With regard to what "B.H.P." says about Mr. Metcalfe's attitude, and the policy of the railways towards brake testing being unknown outside the C.M.E.'s offices, I would refer him to page 442 (THE MODEL ENGINEER, November 7th, 1935) where "L.B.S.C." reports what was actually told him by one of our leading Chief Mechanical Engineers. Mr. Liversage says that successive locomotives were developed on information obtained on the test stands at Vitry, Swindon and Altoona. I have always understood that Mr. Collet abandoned using the test stand at Swindon for the very reasons set forth by "L.B.S.C."

Finally, "B.H.P." suggests that the haulage test is not a true method of assessing a locomotive's performance. I would ask him whether (leaving out out-and-out toys) a locomotive is built for any other purpose than to haul a load on the track? We know, of course, that to pull a load on the track is its *raison d'etre*. It follows that the engine which makes the best show ON THE TRACK (not on the test stand) is judged by any UNPREJUDICED person in their right senses to be the best engine. Did not the great George Stephenson say, when challenged by a rival who claimed to have built a better engine: "Let the two engines, yours and mine, be coupled back to back; and whichever drags the other one backwards, that is the engine."

Yours faithfully,

West Kensington. BEWAN SPRINGER.

DEAR SIR,—Your correspondent "B.H.P." is quite right in his demand for some standard of performances. As I have repeatedly recommended in these columns, for each gauge the distance travelled in non-stop performance with a given train is the best measure of power. Time must be taken into account. It is difficult to work tests by instruments. I used indicator diagrams just to check valve-setting in 15 in. gauge, and to make sure that each of the four strokes was giving out near enough the same I.H.P. Efficiencies are another matter; although a model boiler can quite easily be more efficient than a full size one per unit of fuel burnt (the plates are thinner), the engine is a long way out yet, for obvious reasons. Some years ago, I made out that a given scale amount of water would take a scale train only one-fifth of the scale distance. The efficiency of the full size steam locomotive may be 10%. A fifth of this means 2%, viz., that 98% of the energy of the coal is being lost. Our model pundits still appear to think that steam is a perfect gas, which can be expanded just at the will of the mechanic. A fellow member of the S.M.E.E. (Mr. Keiller, to wit), whispered to me when I was sitting next to him at a recent meeting: "It is astonishing how large the losses are when you come to take real measurements." I have just analysed the valve gear drawings of what is said to be a very successful model locomotive; I find its valves are never more than half open, and that it could not

start at all at two points in one revolution of the driving wheels. We could pull 40 coaches easily on a 15 in. gauge level line, but the number we sent away with a train which was required to keep time was 15. On an unfavourable day, I have nearly come to grief with a train of this length (slipping). I started in 1899, with some experience in the drawing office and works, making full size locomotives, and made a mess of a model. Fundamental data I had galore, but not suited to models. However, what I have since published in these pages, gained from actual model experience, for the most part stands, at least since 1904. Dimensions, of course, vary with the enlargement in prototypes now available.

I am glad to note Mr. Willoughby's warning as to cylinders. The dimensions otherwise proposed are the result of the quite inaccurate data that is afloat.

Yours faithfully,
HENRY GREENLY.

Hounslow.

Electric Motor for Driving Workshop Machinery.

DEAR SIR,—In the November 21st issue of the "M.E." I notice that in reply to Query No. 6741, from W.T.W., you state that at least $\frac{3}{4}$ h.p. will be necessary for driving a circular saw for sawing soft woods up to two inches thick.

Perhaps my own experience will be interesting to yourself and your querist. My motor is *one quarter h.p.* and it drives my 4 in. lathe and a circular saw 6 in. diameter, also another circular saw 4 in. diameter, (one machine at a time, of course). For the lathe, the power is ample, and I can turn anything within the capacity of the lathe, back gear being used for cast iron or M.S. of large diameter. *For the 6 in. saw it is also quite satisfactory.* Naturally, I do not waste any power in driving unnecessarily heavy countershafts, heavy or tight belts, etc., and of course I cannot flick off the end of a 2 in. plank in the approved saw-mill manner, neither do I need to do so. The 6 in. saw runs at about 2,800 r.p.m., which I admit is only about half the theoretical speed, still, in the language of "L.B.S.C.," it "does the doings." I can saw up to $1\frac{1}{2}$ in. thick in ordinary deal, or up to 1 in. thick in oak or mahogany, cross cutting or ripping. The position of the saw table allows cutting wood lengthways (ripping) up to 3 ft. long, or cross cutting any piece 6 or 8 ft. long. This, for my purpose, is all I ever need. The saw, of course, does not exactly "walk through" $1\frac{1}{2}$ in. deal, but it certainly goes through it much quicker than I could get through it with a hand saw, and *this is the point*, it saws the edge *dead straight* and *perfectly square* with the face, so that actually no planing of edges is needed. This is the real charm of the circular saw, which has only to be experienced to be appreciated when subsequently assembling any small cabinet or box. It is not so easy as might be supposed to plane the edge of a board dead square with the face and parallel with the other edge, at any rate by the unpractised amateur, no matter how good his plane. The secret of success lies in the following essentials:

(1) The saw must be thoroughly clean, very sharp, and well set to cut a kerf just under twice the thickness of saw.
(2) It must run dead true, and have the merest suspicion of end play.
(3) The wood must be thoroughly dry.
(4) The feed must be dead parallel with plane of saw, and guided by a rigid fence, to avoid any twist being given to the wood in either a horizontal or vertical plane.
(5) The feed must not be forced.

Yours faithfully.
G. E. COUPLAND.

Bridlington.

An American or Canadian "Switcher."

DEAR SIR,—In your issue of the 14th November you publish an illustration taken from "an obviously old" photo, of an American or Canadian Shunter.

Examining your reproduction under a magnifying glass, the following appear conspicuous by their absence:

1. Buffers; how did the Shunter shunt forwards?

How did the switcher hang on? There appears to be no handrail in front or at the sides of bunker.

2. Looking at the prototype from the same angle as your illustration, one would expect to catch a glimpse of the throttle, which in its off position would in these old types be seen extended to the right. Likewise, reversing lever and connections. With the exception of a hanging chain (?), the cab seems to be bare of fittings.

Does the single tube represent the safety valve? There does not seem to be any connection for the whistle and feed delivery.

Is it possible that this engine was built to demonstrate some centenary? The surroundings seem to be fairly modern.

Yours faithfully,
FRANK L. RAMSHAW.

Southampton.

Model Fire Engines.

DEAR SIR,—I was very interested in the description of the Model Fire Engine in the November 21st issue of the "M.E.," and seem to remember a coloured plate of such an engine some years ago. I wonder if it would be possible for a contribution to give an article and drawings of one of the most modern of these engines; they were a more inspiring sight in action than our present-day appliances.

I am sure a good many would build one, there is room for plenty of good work and finish, and if built large enough, practice could be had watering the garden, washing the car, etc.; the difficulty at present is to get information and drawings, perhaps some of your readers could oblige.

Yours faithfully,
JOHN C. SNELLING.

Sutton.

(The coloured plate of a steam driven fire engine referred to by our correspondent was published in the issue of the "M.E." dated January 2nd, 1908.—ED., "M.E.")

Cornish Engines.

DEAR SIR,—I have been very interested in the recent correspondence in "Ours" re Cornish Engines. Possibly my nom-de-plume will explain why I could not refrain from taking a hand. "W.M." thinks Mr. Cole is wrong about the makers of the engine illustrated. Mr. Cole is, however, probably right, as Messrs. Holman Bros. made quite a number of these (incidentally, the founder of the firm made the boiler for Trevithick's first locomotive). The photograph by Mr. Cole does not give sufficient of the surroundings to identify the engine absolutely, but it is either at East Pool or Carn Brea (not Carn Bree).

I can assure Mr. Woodall that the engines at Millom are still in existence, and working 24 hours a day.

I believe I am correct in stating that Messrs. Harvey & Co., and the Perran Foundry made one each of the biggest Cornish Pumping engines ever made, both engines having a stroke of 144". These engines were used on the Severn Tunnel. Incidentally, the correct method of describing the cylinders of these engines is, bore and stroke both in inches, not inches and feet.

Yours faithfully,

Glasgow. "COUSIN JACK."

Institutions and Societies.

The Society of Model and Experimental Engineers.

Meetings. At Caxton Hall, Westminster, at 7.0 p.m.

To-night, December 12th. Annual General Meeting. Visitors are not admitted to this meeting.

Wednesday, January 1st, 1936. Lecture by F. J. Slee, Esq., B.A., B.Sc., of Shell-Mex & B. P., Ltd., on "The Selection of Oils for Industrial Purposes."

Secretary, R. W. WRIGHT, 202, Lavender Hill, Enfield, Middlesex.

The Finchley Model Engineers' Society.

Fixtures for December are as follows:—December 18th, Lecture by a representative of the Enfield Cable Works, on the construction of Flex and Cable. The above will be held at Avenue House, Church End, Finchley, N.3.

A visit has also been arranged for December 14th, to the Switchgear Works, of Messrs. B.T.H. Ltd., Masden Lane, Willesden.

Further particulars from the Hon. Sec., S. C. PRITCHARD, "Bishopswood," The Bishops' Avenue, East Finchley, N.2.

Croydon Society of Model Engineers.

Will all members please attend the exhibition in the evening of Dec. 14th? Mrs. Turtle has kindly consented to present the awards at 8.45 p.m.

Next meeting will be held on Dec. 16th at 8 p.m., at Clyde Hall, Clyde Road, Addiscombe, and will be a demonstration night.

H. W. CLEMENTS, Hon. Sec., "Olivedene," Coulsdon Road, Old Coulsdon.

Edinburgh Society of Model Engineers.

Meetings are held every Tuesday and Friday evening at 7.30, in the Society's rooms at 1a, Ramsay Lane, Castlehill. On Tuesday, December 17th, Mr. M. J. H. Cowie will describe the building of his working model of a picket boat. On Tuesday, December 31st, a lantern lecture entitled, "Clyde River Steamers of the Last Seventy Years," will be given by Mr. R. B. M'Kim.

Hon. Secretary, R. HALDANE, 27, Riego Street, Edinburgh, 3.

The Manchester Society of Model and Experimental Engineers.

The next meeting of the above Society will be on Friday, December 13th, 1935, at the Manchester Schools of Technology, Sackville Street, Manchester, at 8 o'clock. Will all members try to attend this meeting *re* proposed visit to a works?

W. E. WOOD, Hon. Sec. and Treas., 20, Albert Place, Longsight, Manchester, 13.

The Junior Institution of Engineers.

Friday, December 13th, 1935. At Royal Society of Arts, John Street, Adelphi, W.C., at 7.30 p.m. Inaugural Meeting. Presidential Address. "Coal, Power and Smoke," by Sir Frank E. Smith, K.C.B., C.B.E., D.Sc.

Friday, December 20th, 1935. At 39, Victoria Street, S.W.1, at 7.30 p.m. Informal Meeting. Film on the "Fabrication and Application of Hewittic Rectifiers," to be followed by a discussion.

Notices.

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written on one side of the paper only, and should invariably bear the sender's name and address. Unless remuneration is specially asked for, it will be assumed that the contribution is offered in the general interest. All MSS. should be accompanied by a stamped envelope addressed for return in the event of rejection. Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All subscriptions and correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co., Ltd., 13-16, Fisher Street, London, W.C.1. Annual Subscription, £1 1s. 8d., post free, to all parts of the world. Half-yearly bound volumes, 11s. 9d., post free.

All correspondence relating to Advertisements and deposits to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," 13-16, Fisher Street, W.C.1.

Contents.

The asterisk (*) denotes that the subject is illustrated.

Advertisements are inserted in these columns at the rate of **One Penny** *per word; minimum charge for advertisement,* **One Shilling.** *Single letters or figures are charged as words, and a compound word as two words. The advertiser's name and address are charged for.*

Advertisers who wish to separate *their announcements into distinct paragraphs must have not less than 20 words in any one paragraph followed by the word "Below"—which is charged for.*

"Box" replies, *care of these offices, are charged 6d. extra to cover postages. The following words must appear at end of advertisement: "Box——, 'Model Engineer' Offices," for which usual rate will be charged. (Advertisers need not include our full address.)* **When replying to a "Box No." advt.** *address your envelope: Advertiser, Box——, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

All advertisements in these columns must be prepaid, *and remittances should be made by Postal Orders or Stamps, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

Please state under which Classified Heading you wish your advertisement to appear; the classifications are as follows:—

General, Models, Wireless, Motoring Tools, Engines, Electrical, Business, Wanted.

Advertisers are requested to send in their announcements as early in the week as possible, as although we accept advertisements up till the first post on Friday preceding the date of issue, **we cannot guarantee the insertion of those arriving on this day.** *Telephone: Holb.:* 3818-3819.

OUR DEPOSIT SYSTEM.

We will receive from intending purchasers the purchase money of any article advertised or sold by our advertisers, and will acknowledge its receipt to both the Depositor and the Vendor, whose full names and addresses must be given. Unless otherwise arranged beforehand between the parties, it is understood that all goods are sent on approval, and that each person pays carriage one way if the goods are returned. The deposit is retained by us until we are advised of the completion of the purchase, or of the articles having been returned and accepted. In addition to the amount of the deposit, a fee of 1/- for the sum of £1 and under, and 1/6 for amounts in excess of £1, to cover postage, etc., must be remitted at the same time, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the deposit must be sent either by Postal Order or Registered Letter. **(Cheques cannot be accepted.)**

The fee mentioned above should be sent in stamps or by Postal Order as a separate amount.

In cases of exchange, money to the value of the article should be deposited by each party. **We cannot receive the articles themselves.**

General

Watch Repairers. Send 3d. for list of Tools, Materials, Watches, Clocks, Gramophone Parts. Guaranteed watch repairs. Complete clock movements stocked. Parcels fully insured.—BLAKISTON, Ainsdale, Lancs.

Cheap Printing. 1,000 Billheads, 3s. 6d. Samples free.—CRETEWAY PRESS (22), Buxted, Sussex.

Case-Hardening and Heat Treatment. Send your inquiries to.—KASENIT, LTD., the recognised specialists, Henry Street, Bermondsey, S.E.1.

Small Turned Screws, Nuts and Washers. Assorted gross B.A., brass 2s., steel 2s. 6d. Whitworth, brass, 3s., steel, 2s. 6d. List and samples, 2d. Trade supplied.—J. H. BENNETT, Station Road, Willesden Junction, N.W.10.

M.E. Hexagon Screws, Nuts and Washers, lowest prices, gross lots, large assortment of other sizes.—ALLNUTT & Co., Lee Chapel Lane, Langdon Hills, Essex.

For Carnival Novelties, Decorations, Flags, Balloons, Streamers, Hats, etc., go to V. O. GINN AND Co., 16, Red Lion Square, High Holborn, W.C.1 (close to Kingsway). List free. Chancery 7654.

"Machine Shop Companion." Splendid book, 100 illustrations, post free 2s. 3d. (abroad 2s. 6d.).—BENTLEY'S PUBLISHING COMPANY (Dept. M.E.), Halifax, Yorks.

Reduced Prices: Eureka Improved Air Compressors. Castings and Drawings from 9s. per set. Photo 3d.—POYSER, Peck's Hill, Mansfield.

Screws, Nuts, Washers (Special Model Engineers' Sizes). Everything for Electrical Rewinds and Repair. Lists free.—LUMEN ELECTRIC COMPANY, Scarisbrick Avenue, Litherland, Liverpool, 21.

Bargains. New Ball Bearing Grinding Heads, 5s. 6d.; 12 Volt, 10 amp. Charging Dynamos. Cost £10, perfect, 10s. each; Machine Vices, new, special jaws, 6s.; ½" Bench Drills, hand, new, 18s. 9d.—JOHN M. E. STEEL, Bingley.

Air Compressors, New patent, 25s.; Super Spray Guns, 17s. 6d. Complete plants.—JOHN M. E. STEEL, Bingley.

Brilliant Copal Varnish for Models, sample tins, 9d., post free.—WM. QUICK, Gurnard, Cowes, I.W.

5" Sterling Chuck, Flush Back-plate, screwed for 3½" Drummond, 17s. 6d.; Electric Grinding Attachment, 15s. 6d. Both little used.—ALEX. GRIEVE, 70, Raeburn Place, Edinburgh.

EARLIER PRESS DAYS

Owing to the Christmas Holidays, the December 26th issue will close for Press—

2 DAYS EARLIER

All DISPLAY ADVERTISEMENT pages will close for Press on **Tuesday, December 17th,** and the closing time for PREPAID ADVERTISEMENTS will be first post on **Wednesday, December 18th.**

Advertisements received after the above dates will be inserted in the January 2nd issue.

Bargains (Foreign). As long as stock lasts. Cl.W. Boats, 12" listed for 2s. 6d.; El. Boats, 21" listed for 15s.; El. Boats, 28" listed for 18s.; Cl.W. Boats, 28" Beam, 6" listed for 15s.; Cl.W. Cruiser with 2 cabins and El. Lights, listed for 25s.; El. Cruiser with 2 cabins and El. Lights, listed for 25s.; Sailing Boats, 32", listed for 18s.; Sailing Boats, 40", listed for 30s. All Boats are new and made of best grade Mahogany Wood. Marinê Steam Engine d.a. oscillating cylinders by Bassett-Lowke, complete with Copper Boiler, hand soldered, 12s.; 4 Volt Electric Motor, very powerful, listed for 2s. 6d.—F. C. REISER, 72, Twyford Avenue, London, W.3. Phone ACOrn 1783.

Metals, Small Quantities, Rounds, Flats, Sheet or Hexagon.—54, Ravenor Park Road, Greenford, Middx.

"Ajax" Safes Might Save Ruin from fire or theft any time. List, application.—GREENWOOD, Arnside Road, Southport.

Casting Moulds for lead toys. Sample mould, 2s. 9d. Catalogue free.—Below.

"Home Toymaking," just published, 180 illustrations, 1s. 2d. posted.—INDUSTRIES, 13, Gordon Avenue, Twickenham.

18 Parts Pitman's Engineering Educator; 23 Parts Automobile Engineering. What offers?—JOHN ROBERTSON, Balnasuim, Strathay, Perthshire.

"M.E." Vols. I, II and III, in original bindings. Perfectly new, as received from binders; also Vol. I in reading case with strings, in 12 separate issues. The set of 3 vols., £6 net, a bargain; those in case, £2. Post free. A unique opportunity.—DANSON, 54, Gassiot Rd., Tooting, London, S.W.17.

For You or Your Friend the Allball driven Grinder will make an ideal Xmas present. Its high efficiency, speed and durability will delight anyone. Complete for 50s. Guaranteed 12 months. Mail for illustrated brochure.—63, Raymond Road, Redruth.

Clock Movements of every description ready for cases. Lists and hints on case making post free.—NEEDHAM, 25, Stratton Road, Manchester, 16.

Ball Bearing Plummer Blocks, 1", 5s.; ¾", 4s. 3d.; Gun Metal less 50 per cent., Shafting, Hangers, Pulleys, Cones, complete Countershafts from 10s.—Below.

Ball Journals, ¼", 9d.; 5/16", 10½d.; ⅜", 1s.; ½", 1s. 2d.—HALL, 30, Collindale Avenue, Erith.

Bond's Maximus Driller, unused, 17s. 6d 120 watt. Dynamo, ball bearing enclosed type, wants re-winding, 7s. 6d. Armature, 5" long, 4" diameter, with 54 section commutator, 5s.—SMITH, "Glenwood," Perranwell Station, Cornwall.

"Model Engineer" Three Bound Volumes 1933/34. Perfect Condition. 18s.—Box 930, MODEL ENGINEER Offices.

Iron-Steel-Cement, 4 oz., 1s. 3d.; 1 lb., 4s. 6d.; Lead, Brass, Aluminium, Zinc, 4 oz. 2s. 6d.; 1 lb., 7s. 6d. Carriage paid.—ALBERT FEATHER, Manufacturer, 93, White Abbey Road, Bradford, Yorkshire.

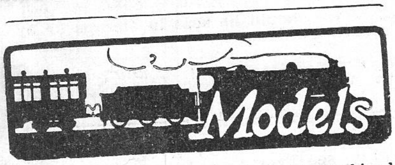
Steam Cars on the Road Again, largely due to the efforts of our Monthly Journal, "Steam Car Developments and Steam Aviation." Several more are to come for 1936. Published by R. H. and H. W. BOLSOVER, Whitby. Price 9d.

"The Home Handyman." 1,001 jobs in the home simplified. Contains nearly 2,000 illustrations. This book shows how to make innumerable things which go towards the completion of the home. The instruction given comes from thoroughly experienced practical men and women, and when the task has been accomplished there need be nothing about it to stamp it as the product of the amateur. Price 6s., by post 6s. 9d.—PERCIVAL MARSHALL & Co., LTD., 13-16, Fisher Street, W.C.1.

Home Cinematography

Electric Home Cinemas, standard films, cheap. Lists.—WAYLAND, 109, Kenlor, Tooting, London.

Movies at Home. How to make your own Cinema Projector. Particulars free.—MOVIESCOPE (O), Pear Tree Green, Doddinghurst, Essex.



"Pioneer" Castings and Parts, machined or rough. Stamped envelope for list.—FENN, 2a, Charles Place, Drummond Street, London, N.W.1.

Boilers in Steel or Copper, all types and sizes. Locomotives Boilers from ½" scale made to fit your frames, flanged plates, supplied copper or steel.—GOODHAND, Marlborough Road, Gillingham, Kent.

Bargains! Large stock to clear; some of the goods described are sold 70% below their actual factory cost; mostly foreign goods. Sailing, Clockwork, Electric and Steam Boats from 2s. 6d. to 15s. Also Steam Engines, Boilers, Locos., Trucks, Electric Motors by Stuart's, Marklin's, Bing's also Rails, Sheds, etc. Inspection invited without obligation.—F. C. REISER, 72, Twyford Avenue, W.3. Phone ACOrn 1783.

Vertical Boiler, 16 × 7" Fittings, sound condition, Stuart No. 10. Lot £2 10s.—HOWELLS, Coppice Lane, Quarry Bank, Staffs.

Gauge "O" 72 ft. Bond's Steel Electric Track, perfect condition, 30 Sleepers yd., £2; Hornby Electric 4-4-2, £1.—STANLEY, Thorn Bank, Joll Lane, Gee Cross, Hyde, Cheshire.

Gauge 1 G.N.R. Atlantic, High Pressure Steam Loco., £9 10s.; also oil-fired Sentinel type ditto, runs half mile between stokings; High Class Model, £7 10s. Engines built to order.—MACLEOD, "Beausite," Upper Wyche, Malvern, Worcs.

Vertical Steam Engine, 2 in. bore, 2½ in. stroke, absolutely new, fine model, finish perfect, 55s.—Below.

4 Sets of Tender Pump Castings, 1s. 9d. each; 2 New Surface Plates, 4 in. by 5½, 7s. 6d. each; Blowlamp, shop soiled, 4s.—EAST GARAGE, Whapload Road, Lowestoft.

Dyak Frames, 2s.; Hornblocks and Axleboxes, 3s. 9d. set; Driving Wheels, 8d.; Pony Wheels, 3d. each; Pony Truck Casting, 1s.; Pump and Nut, 9d.; Eccentric Straps, 6d.; G.M. Cylinder, complete set, 11s.; pair Boiler Barrel Fire Superheater Tubes, 5s. 6d.; all Plates Specially Softened, 6s. 9d.; Smoke-box Tube, 1s. 6d.; Dome, 8d.; Firehole and Chimney Materials, 6d. each; Smoke-box Door, Blank and Ring, 1s. 4d.; Maisie All Frames, 6s.; Hornblocks and Axleboxes, 6s. set; Driving Wheels, 1s. 6d.; Trailer, 10d.; Bogie Wheels, 7d. each; G.M. Cylinder Castings, 16s.; Castiron, 10s. 6d. Everything in stock. Postage extra. Stamp for inquiries.—SUMMERSCALES, Soham, Ely, Cambs.

Stuart, No. 7A. 1" × 1" Vertical Steam Engine, Steam Valve and Lubricator. New condition. Hardly used, 55s.—S. HALL, Dale End, Bradwell, Sheffield.

Stuart Marine 495 Boiler, Fourteen Tubes Superheater, also Stuart 10 Horizontal ¾" × ¾". Good condition. Lot 37s. 6d. Would separate. —PEICE, Paragon, Clifton, Bristol.

Castings and Drawings for L.M.S. "Pacific," "The Princess Royal," and Southern Railway "Schools" class, 4-4-0, 3 cyl. Both 3½" gauge. These make up into close copies of originals. Also castings for 2½" and Gauge 1. Stamp.—H. P. JACKSON, 90, Holgate Road, York.

A Small Gauge Internally-fired high pressure Locomotive by "Ejaycee" is the Rolls Royce of the model world. Repairs and repainting a speciality. Why not have your model brought up to date. Send for list and estimate. "Ejaycee" Models.—E. J. COOKE, 66a, George St., Hastings.

2" Gauge Steam, Four Wheel, Single driver Tank Loco. and Track. Fixed single action, Slide valve cylinders, Reverse Copper Tube Boiler, £3.—Bargain.—154, Woking Rd., Guildford.

Gauge "O" Railway, Bassett-Lowke "Royal Scot," Clockwork, Coaches, Wagons, Signals, Station, 40 feet Lowke Track, 4 Points, other details, £6, or nearest. Bargain.—COOPER, Alder Street, Winton, Eccles, Manchester.

Large Scale Marine Engine, Exhibition Finish.—MOUNTAIN, 59, Pendle Road, Streatham, S.W.

1" Scale North Eastern Atlantic, Coal-fired, Link Motion, Powerful; also 3 2½" Gauge Locos.; Bassett-Lowke's No. 2 Tanjye Engine and Boiler, 3" Ornamental Precision Lathe, ¾" Scale Pacific Coal-fired Link Motion Bogie Tender. Stamp.—45, Elms Lane, Sudbury. Wembley.

Dyak, Gauge 1, Driving Wheels, $2\frac{1}{16}$", 2s. 6d. set; Pony and Tender Wheels, 2d. each. —Below.

Powerful Traction Engine, 1½" Scale, Drawings, Castings, Materials, Fittings, Machined Parts. List 1½d.—A. J. EVERY, Engineer, Mill Lane, Shoreham-by-Sea.

Monoplane Power Driven, 7 Feet Span, 18 c.c. "Comet," two stroke power Unit in Duralumin Crash Proof Mounting, complete with petrol tank Carburettor, Light Weight Coil. Beautifully made and finished. Ready to fly. What offers? Would exchange for Coal-fired Loco.—SAWYER, "Query," Whitehall Road, Evington, Leicester.

15c.c. Xmas Messages. R. G., Kilmarnock, says: "Your Engine is a fine little job." L.P., Malden, says: "Tried Carb. to-day and got 31 m.p.h." F.K., Oldham, says: "Castings machined up into a nice carb." R.S., Clapton, says: "Castings are best I have seen for 15c.c." A firm writes: "Our engineer has reported on castings and speaks very highly of them." Now, what do you say? Remember prices (postage paid) 15 c.c. Engine Set, 15s.; 15 c.c. Carb. Set, 4s.; 30 c.c. Carb. Set, 4s.; Photo, 6d. Full Blue Prints and Duralumin for Con. Rod now included. Give yourself a present. Send now.—LOWRY, 6, Grasmere Gardens, Ilford, Essex.

Midge Castings, Special Offer. 4 Wheels, 4 Axle Boxes and Keeps, 4 Buffer Heads, 4 Horn Blocks, 2 Extension Brackets, 37s. 6d. 1" Scale Traction Engine Castings, best material. Stamp list.—GOODMAN, 76, Spencer Road, Wealdstone, Middx.

Locomotive Plates, Unique Collection of 25 from Engineering 1874/87. Six 1½" scale Working Drawings from "The Engineer," /75 to /78, including Beatties Express, Nov./69, in excellent condition. £3 3s. 0d.—PEAKEN, Crockendale, High Salvington, Worthing.

Sale, 7 m/m Orange Princess Royal, by Miller and Swan, with special Electric Exley. mech.cab fittings. Shown at "M.E." 1934 show. Reviewed and illustrated MODEL RAILWAY NEWS, Nov., 1934. Gauge I. Royal Scot, by Bassett-Lowke, same as G.P.O. Exhibition models, Gauge I. Steam Titley Court, by Lowke, solid firing and axle pump. Boiler needs painting. Good working order. Offers invited.—CONWAY, Langwell, Merthyr Tydfil.

"Model Steam Locomotives." Their Details and Construction. By Henry Greenly, A.I.L.E. With 376 photographs, diagrams and working drawings. Choice of Scale and Gauge—Locomotive Types—The Principles of Model Locomotive Designs—Boiler Design—Construction Details: Frames—Axle-boxes and Springs—Wheels, Axles, Crank Axles and Crank-pins—Bogies, Pony Trucks and Radial Axle-boxes—Cylinders—Valve Gearing: Motion Details—Boiler Construction—Boiler Mountings and Cab and other Fittings—Tenders and Drawgear—Firing and Boiler-feeding Devices. Price 6s. 6d., post free.—PERCIVAL MARSHALL & Co., LTD., 13-16, Fisher Street, London, W.C.1.

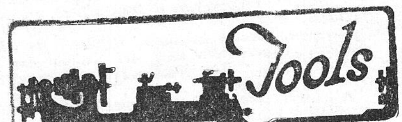
½", ¾" and 1" Scale Locos. Several fine coal fired Models for disposal, all fine workmanship and bargain prices. Full details and photos.—H.K., Willoughby House, Mablethorpe, Lincs.

Stuart No. 1, 2 × 2 Double Column. New and perfect. 70s. No offers.—CHAPMAN, Theydon Lodge, Woburn Sands.

1" Scale "Model Engineer" Traction Engine Castings. List Stamp. Parallel Reamers. $\frac{3}{16}$", 1s. 6d.; ¼", 1s. 9d.; $\frac{5}{16}$", 2s.; ⅜", 2s. 6d.—30, Highfield Road, Doncaster.

Castings, Crankshaft, Gears, Material. Horizontal Petrol Engine, 1¾" × 1¾". Water-cooled, suit boat, 30s. Lightweight Magneto, 6s. 6d. Lecture Lantern, full size, good make, brasswork dirty, Lens, Condenser, 9s. 6d. Particulars stamp.—SHARP, 274, York Road, Wandsworth, London, S.W.18.

All New 2¾" Scale Traction Engine. Parts Boiler, tested 300 lbs., Tank Coal Bunker, Smokebox complete, Chimney, 4 Wheels, front and rear. Cheap.—GILL, Overton, Ellon, Aberdeenshire.



Buck and Ryan's Lathe Department. Drummonds, Milnes, Myford, Exe, Union, Portass, Edgar, Bantam, Boley-Lienen, I.X.L. 5" Leader, Master, and many other well-known makers. Send your enquiries to our special Lathe Department M.—310-312, Euston Road, London.

Wade Lathe Screwcutting Attachment, 15s., post 1s. 3d. extra.—AIRD, Gardner Street, Brighton.

Burnerd Chucks, British Made, for accuracy and lasting service. Small independent 4-jaw with steel bodies, and reversible jaws, minimum weight and overhang, ideal for model, instrument, and precision work, 3¼", 20s., 4", 21s.; 4½", 25s.—Below.

6 in. Independent Model with semi-steel body, suits Drummond 3½" and 4", and larger lathes, 50s.—Below.

3 in. 3-Jaw Lever Scroll Model with 2 sets jaws, 27s. 6d. Small overhang, light weight. Descriptive lists, with backplate prices, on request. All postages extra. Obtainable from all tool dealers; or from: F. BURNERD & Co., Dryburgh Works, Dryburgh Road, London, S.W.15.

Astounding Offer. 24—18 in. lengths 2, 4 and O.B.A. Hexagon Free-cutting Bright M.S., 2s. 6d., post free. Limited stock. Get it now.—GREGORY & SUTCLIFFE, Huddersfield.

Lathes, Power and Treadle, by all the leading makers, in stock. Send your inquiries.—Ross & ALEXANDER (LONDON), LTD., 165, Bishopsgate, E.C.2.

Milling Attachments, Dividing Heads, Circular Table.—WHEELER Co., LTD., Trench, Wellington, Shropshire.

Reduced Prices: Eureka H.S.S. Ball Bearing Drilling Machine, Filing Machines, Rotary Tables, etc. Drilling Machine Drawings and Castings from 10s. 6d. per set. Photos 3d. each.—POYSER, Peck's Hill, Mansfield.

Valuable Set Whitworth Hardened and Ground M. and F. Screw Gauges, ⅛ to 1". Cheap. —GREGORY & SUTCLIFFE, Huddersfield.

Under Cost! Brand New Highest Grade Sets of Lathe Tools (12). Carbon, ⅜", 7s.6d.; ½", 11s.; ⅝", 22s. 6d.; High Speed, $\frac{1}{4}$", 17s.; ½" 19s. 6d.; $\frac{5}{16}$", 21s.; ⅝ × ⅜, 50s.; ¾, 50s.; ⅞, 75s.; 1 in. 90s.—GREENWOOD, Arnside Road, Southport.

Tools by Easy Payments. Lathes, 25s.; Compound Rests, 15s.; Foot Treadles, 35s.; Saw Benches, Power, £3; Treadle, £6 10s.; Constructor's Saw Fitments, 12s. 6d. Lists, 2d.—BROWN BROS., Accrington.

The "Myford" 3" Lathe. The modern tool for Amateur and Engineer. Used by Technical Schools, Instrument Makers, Garages and Production Works. Moderate Price. Illustrated List from—THE MYFORD ENGINEERING Co., Neville Works, Beeston, Notts.

New Bench Drop Stamp, guides 4' 6" × 5" between, bargain 58s. Valuable "Churchill" Hand Morticing Machine, 7 chisels, bargain £6 17s. 6d. Plain Lathe, 6" × 3' bed, Headstock adjustable for turning out of centre, 72s. No. 4 Fly Press with supporting arm, adjustable screw top, complete ball weights, exceptional bargain, 63s.—MIDDLETON, 1257, Pershore Road, Stirchley, Birmingham.

2-5" Holtzappfel Lathes, Chucks, Cutter, Frames, Rests, Cutters, etc.—1, Barham Rd., Croydon.

3 Tons Best Sheffield Files, Flats, Half Rounds, Square, Rounds, in rough and second cut sizes 6", 8", 10", 12", this is a very special bargain offer, wonderful value, three dozen assorted, 10s.; also large files, 14", 16", 18", dozen assorted, 8s. 6d., carriage forward.—Below.

250 Bundles Bright Drawn Mild Steel, approx. 5' length each piece, sizes $\frac{1}{8}$", 5/32", $\frac{3}{16}$", 7/32", $\frac{1}{4}$", 9/32", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", $\frac{1}{2}$" round, 5s. 6d. per bundle of 50'; also Square Bright Steel, sizes $\frac{1}{8}$", $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", $\frac{1}{2}$", 5' lengths, 6s. bundle.—Below.

5,000 Small Slitting Saws, $\frac{3}{4}$" dia., 1/32" thick, clear at 2s. per doz.—Below.

2,000 Slitting Saws, $2\frac{3}{4}$" diam., 1" hole, 1/64" to $\frac{1}{8}$" thick, six assorted, 3s. 6d.—Below.

1,300 Sets Hexagon Die-Nuts, Sheffield made, Whitworth, B.S.F., also American thread, U.S.S. and S.A.E. suitable for Ford and other American cars $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", $\frac{1}{2}$", worth 7s. set, our clearing price, 2s. 9d. set; all the above four sets, 10s. lot.—Below.

120 Bundles Best Quality Silver Steel, round, $\frac{1}{16}$" to $\frac{3}{8}$", 16 standard sizes, 4s. per bundle.—Below.

250 Boxes Superfine Swiss Files, 1 doz. assorted shapes for high-class work, tool-making. etc., 4s. per box.—Below.

500 High Speed Tap Fluting Cutters, cuts taps $\frac{1}{8}$" to $\frac{3}{8}$" dia. of cutters, $1\frac{1}{4}$", $\frac{5}{8}$" hole, 1s. 3d. each, three assorted, 3s. 3d., worth 6s. each; also larger Cutters, $2\frac{1}{2}$" dia., $\frac{7}{8}$" hole, cut taps $\frac{3}{8}$" to 1", 1s. 9d. each; three assorted, 4s. 6d.—Below.

250 Sets Feeler Gauges, 10 blades, long taper, $1\frac{1}{2}$ to 25 thous., a very useful bargain, 1s. 9d. each.—Below.

300 Drill Chucks, takes to $\frac{1}{2}$", three jaws. No. 1 Morse taper shank or $\frac{1}{2}$" straight shank, 2s. 9d. each.—Below.

140 Vee Blocks and Clamps, machined all over, very useful to model makers and machinists, 2s. 9d. each; 5s. pair.—Below.

24 Only, 1" Micrometers, lock-nut and ratchet stop, usual retail price 27s. 6d., all complete in plush lined case and guaranteed accurate, secure one now, 16s. 6d. each.—Below.

500 Gross Tungsten Steel Hacksaw Blades,8",9",10",12", 1s. 3d. per doz.; 12s. per. gross; also Machine Blades, 12" × 1" 2s. doz.; 20s. gross; 14" × 1", 3s. doz.—Below.

1,000 Sets Hexagon Die-Nuts, C.E.I. Cycle Thread, $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", usual price 5s. 9d. set, clear at 2s. 3d. set.—Below.

1,200 Best Quality Straight Shank End Mills, standard sizes, $\frac{1}{4}$" 1s. 3d.; $\frac{5}{16}$" 1s. 4d.; $\frac{3}{8}$" 1s. 6d.; $\frac{7}{16}$" 1s. 9d.; $\frac{1}{2}$" 2s. each. All right-hand, suitable for use in lathe.—Below.

800 Sets 1" Circular Dies. Screwing $\frac{1}{4}$" $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", $\frac{1}{2}$" Whitworth and B.S.F. Clearing at 2s. 9d. per set. Both sets 5s. Die Stocks to suit 1s. 9d. each.—Below.

100 Boxes of Assorted Springs, approx, weight 3 lbs. From 300 to 600 springs. 3s. 6d. per box.—Below.

5,000 Tins Reliable Case-hardening Mixture, for use with ordinary fire, very effective, as used in several large Sheffield works, sample 1 lb. tins, 1s. 3d.; 2 lbs., 2s. 6d.; simple to use and guaranteed to give a glass hard surface to steel or iron, cash refunded if it fails to more than satisfy.—Below.

400 Lathe Tool Holders, $\frac{3}{8}$" Square Shank, complete with super high speed tool. A very useful bargain 1s. 9d. each.—Below.

350 Boring Tool Holders, $\frac{1}{2}$" Square Shank. fitted with $\frac{3}{8}$" round boring bar, complete with high speed tool. These are a very good bargain, Actually worth 8s. 6d. each. Clearing at 3s. 9d. each.—Below.

60 Only, Genuine Norton Grinding Wheels, suitable for general shop use, 9" dia., 1" wide, 1" hole, 4s. 9d. each, also few $1\frac{1}{4}$" wide 5s. 9d. each.—Below.

1,000 Fine Emery Wheels, 2" to 4" dia., $\frac{5}{8}$" hole, $\frac{1}{8}$" to $\frac{1}{4}$" thick, slightly used, but quite serviceable 1s. 6d. per doz.—Below.

5,000 Genuine Norton Grinding Wheels, $2\frac{1}{2}$" dia., $\frac{3}{8}$" to $\frac{3}{4}$" wide, $\frac{3}{4}$" hole, three assorted 1s.; dozen assorted 3s.; six dozen 15s.; gross 25s.—Below.

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Lathe 3 in. B.G.S.C. Self Centring Chuck (3 in.), Ball Bearing Foot Motor Drilling Machine, Emery Wheel driven off Countershaft; al o Drill Chuck and Tools; also Brand New, £.. Photos.—CREW, 26, Lorrimore Road, Walworth, S.E.17.

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3" Tailstock, 5s.; Lead Screw, 7s. 6d.; 4 $1\frac{1}{4}$" Shafting Collars, 5s.; 3-Speed Flat Cone, 4s.; Heavy Compound Grinder Slide Rest for 12" Lathe, £8; 3 Knurling Wheels, 2s.; 4 Years "Model Engineer," 8s.—BLOOMFIELD, 11, Stanmer Park Road, Brighton.

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(2) *Short queries of a general character within the scope of the paper are replied to free of charge provided a stamped addressed envelope is enclosed.*

(3) *Queries of a general character are not replied to by post, except by special arrangement. They will be dealt with in turn either by a short explanatory article in an early issue, or will be published as letters inviting a helpful response from other readers.*

(4) *Where technical information by post is specially desired a charge will be made. The query will be handed over to a selected expert on the subject, who will quote his fee for the service required direct to the querist.* **All queries asking for the winding details for dynamos, motors, and electric apparatus must be accompanied by a fee of 3s. 6d.;** *a similar fee is charged for any subsequent letters of advice required. A stamped addressed envelope must be enclosed in all such cases.*

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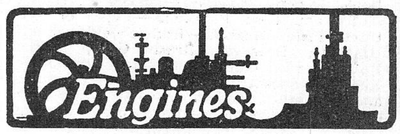

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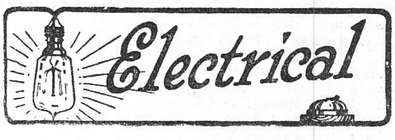

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The MODEL ENGINEER'S DIARY OF FORTHCOMING EVENTS.

December 12th—Lancaster and District Model Railway and Engineering Society. Supper at Carlton Cafe, Market Street, Lancaster, 8 p.m.

December 12th—Manchester Model Railway Society. Cinema film of Society's activities, at headquarters, 7.30 p.m.

December 12th—Society of Model and Experimental Engineers. Annual General Meeting.

December 13th—Junior Institution of Engineers. Inaugural Meeting of 1935-36 Session, at the Royal Society of Arts.

December 17th—Edinburgh Society of Model Engineers. Lecture by Mr. M. J. H. Cowie, describing the building of his working model picket boat, illustrated by lantern slide, 7.30 p.m.

December 19th-21st—Manchester Model Railway Society. Annual exhibition at Albert Hall, Peter Street, Manchester.

December 20th—Junior Institution of Engineers. Film on the Fabrication and Application of Hewittic Rectifiers, 7.30 p.m.

December 20th and 21st—Manchester Model Railway Society. Annual Exhibition at Albert Hall, Manchester.

December 31st—Edinburgh Society of Model Engineers. Lantern Lecture entitled "Clyde River Steamers of the last Seventy Years" will be given by Mr. R. B. McKim, at 7.30 p.m.

January 15th-18th, 1936—Finchley Model Engineers' Society. Exhibition at "Arcadia," Church End, Finchley, N.3.

January 17th-18th, 1936—Altrincham Model Power Boat Club. Exhibition of Models at Public Hall, Altrincham, Cheshire.

January 29th, 1936—P.M.A.L. Annual Dance and Exhibition of Models at The Farnan Hall, Streatham, 7 p.m. to 12.

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